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THE FOUNDRY

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Trade Outlook.

That even such a disturbing element as a general machinists' strike has not affected the consumption of iron is told by the blast furnace statistics for June, which show that there has been a decline in the weekly capacity of the coke and anthracite furnaces from 306,091 tons on June 1 to 303,793 tons on July 1, while the stocks of pig iron in the hands of the merchant furnaces declined from 333,813 tons on June 1 to 327,761 tons on July 1, in other words, production and consumption nearly balanced.

The complaint is heard from all quarters that foundrymen are showing more than usual conservatism in providing for their future wants, and that their buying of iron is done in small lots of the rush order variety. At some of the leading centers the molders are rather restive and there is no doubt but that many foundries have been kept practically in continuous operation throughout the machinists' strike, as much for the purpose of providing a temporary supply of castings in case the molders should see fit to take the warpath, as a desire to keep some parts of their works running.

There is no question but that a larger business would have been done during the second quarter of the year if labor troubles had been absent, but even with these the consumption of all kinds of material has been phenomenal.

New foundries are being built at a rate which almost savors of a boom and a great number of existing plants are being extended and provided with better equipment. The strikes of molders at several jobbing foundries and the inability of these to furnish castings promptly, is in a measure responsible for many concerns building their own foundries to supply themselves with castings.

Take It in Small Doses.

The promoter and stock speculator is beginning to take a hold upon the casting industry and while the majority of concerns, whose stock is for sale, are perfectly legitimate, not so much can be said for those of a couple of steel casting companies which are being boomed through the press.

Investors are practically promised that the profits will amount to 50 per cent yearly, a rate which we believe no manufacturing concern can keep up without meeting with sufficient competition to force this down. One of these companies says that it can make steel castings at 3½ cents per pound and sell them from 18 to 30 cents per pound. Its cost of manufacturing may be somewhere near right, but its selling price lacks confirmation and would certainly require a most excellent corps of pursuasive salesmen.

The advertisements of these concerns, inviting the public to step up and double their money at regular intervals, sounds too much like giving a good thing away, something which is very seldom done. Any legitimate enterprise which can pay monthly dividends of 3 per cent will not have to spend thousands of dollars in advertising to induce others to gobble up its stock. Money is always ready to support an undertaking which can guarantee a reasonable return on its investment.

Cupola Explosions.

There has lately been a regular epidemic of accidents to cupolas, through which more or less damage has been done to property. One of the worst of these occurred in the plant of the American Car & Foundry Co., at Chicago, June 26, and as a result thereof two persons died within a short time and half a dozen others received burns of a serious nature.

The immediate cause of this explosion, which tore a great opening in the cupola shell and scattered part of the lining far and wide, is supposed to have been an old shell which found its way into a charge along with other scrap metal. It would seem, however, as if this kind of material should have been carefully examined before being charged into the cupola, although we are all acquainted with the recklessness with which scrap of all kinds is handled at large works.

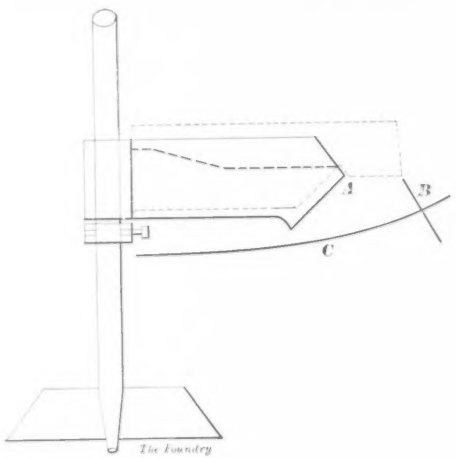
Nothing but great care can prevent accidents of this kind and it should be exercised. Hollow castings of any kind should be broken before being charged, or at least provided with a small opening, so that the air may escape as the casting is being heated.

Making a Bevel Friction Web Center.

This was a broken down job and "wanted today sure;" no time to make a pattern so we had to sweep it up. It was as plain as the proverbial washer that leaves its own core, but this is how it was done.

After placing spindle in socket, and partly filling the hole up, we placed sweep in position as shown by heavy lines, taking care to set it so that point A would come to where we intended the floor joint should be, and then proceeded to work it around over a bed of number two sand, ramming the entire bed solid, so that when the sweep was moved around it showed a clearance of something like an inch between it and the bed. Then we put number four sand on and patted it down while working the sweep around. Afterwards facing was applied and pressed on with one hand while working the sweep with the other. Sweep was taken off the spindle and no attempt made to sleek or finish the mold. Newspapers were used to cover the entire mold and nicely sifted sand placed on it, after which another sweep was placed on spindle as indicated by small dotted lines, and while thickness was being swept on with fine sifted sand, the joint was being swept also, as the sweep was intentionally left longer than was necessary for this purpose as shown in sketch. The thickness being completed, the sweep was removed, spindle drawn out, and the hole that it left filled up. Then another layer of paper was placed over the thickness instead of parting sand, the hub with six braces attached was placed in position, the top braces being shown by heavy dotted lines.

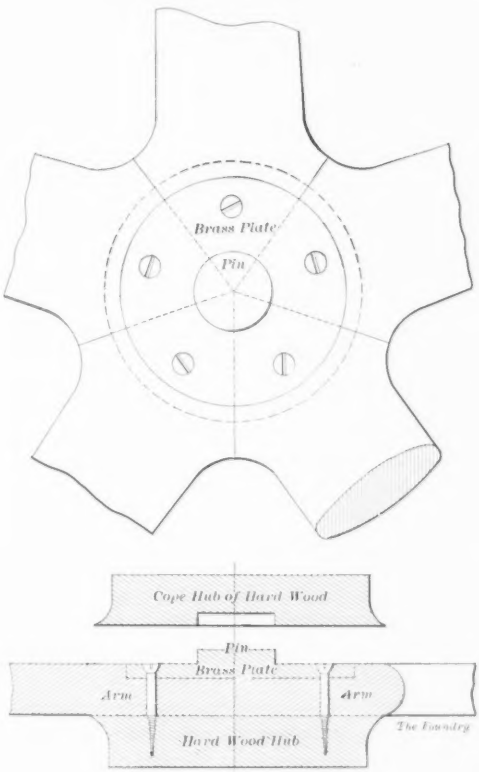
Parting sand was now applied on outside joint, enough facing placed between braces to receive the gaggers, a good strong circular cope located and rammed up, and after being staked, and before it was lifted off, the floor was cut down just about as shown at B, and vents inserted at C. Venting was done this way because of there being no pattern, and if the mold was vented with the cope lifted off,



the chances were that the wire would plow up and crack the mold. The cope was now lifted off, turned over and finished. Some paper stuck to the cope but that mattered little; the thickness was removed from the mold after which the paper was taken out of the bottom; then a "boss" with core print was bedded in the center and a needle wire used all over the face of web to catch vents C, that had been inserted before lifting off the cope. The task of finishing the mold was an agreeable one. The paper had not made much of a muss and yet answered the same purpose as parting sand. In measuring length of hub core, the "boss" and print that had been bedded in bottom was placed against upper hub and thickness of plate added, core located, cope closed on, mold cast and casting turned out as slick as a peeled onion. RICHARD BARNETT.

Fastening the Arms of a Wheel Pattern.

The sketches below illustrate a way of fastening together the arms and hub of a small fly-wheel pattern. We have tried a number of ways but so far have found this the most satisfactory. The arms are made to run to the center and the hardwood hub is glued to them. A recess is turned in the cope side to take the brass plate, which is screwed in place with one screw in each arm into the hardwood hub as shown. The cope hub, which is loose, is turned with a recess to fit over the pin part of the brass plate. There is



nothing very new about this, but it may be a suggestion to some of your readers.—"Hobo" in American Machinist.

One Way of Breaking a Strike.

Z. G. Simmons, of Kenosha, Wis., multi-millionaire philanthropist, former mayor and proprietor of the Simmons Manufacturing Co., rolled up his sleeves and worked as a common molder today. He took the place of a striking foundryman, and the foreman, general managers and Z. G. Simmons, Jr., followed the leadership of the old manufacturer. In the grime, dust and sweat of the shop the men spent the day, and will continue to do so until their men return to work.

The Simmons Co., through the manager, this afternoon sent out a statement to the striking foundrymen that it would no longer treat with them in regard to a settlement of the strike. If the men return to work they must do so as individuals, as the company has arranged with its trade for a long fight and will make no concession to the strikers. In the meantime, the foremen, office help and managers are turning out work the same as if the strike had not occurred.

Mr. Simmons said, after five hours of work, that he was satisfied that he and his office help could operate the foundry until such a time as the men would go back to work at the terms offered by the company. There were fifteen of the head men of the plant stripped to the waist in the foundry this afternoon, and the molten iron seemed to have no terrors for them.

The action of the managers of the plant in going into the foundry to turn out the work has caused a sensation among the men, and many are clamoring to return to work.—[Milwaukee Sentinel.

A New Method of Melting Borings.

Mr. Burt H. Whiteley, of Muncie, Ind., has devised a method of melting small metallic fragments, such as borings or drillings.

The process or method consists in melting a quantity of pig iron in comparatively large pieces in a furnace, thus providing what may be termed a "bath." The borings or drillings are delivered into this bath, which is then stirred or agitated so that the ingredients are thoroughly mixed. Heat is afterwards applied to the products and the borings or drillings melted while in this mixed state with the bath, after which the molten metal is drawn off, but leaving, if desired, a sufficient quantity to constitute a bath for the next supply. This operation is repeated as often as desired or necessary.

The bath constitutes a retaining medium by which the light particles are detained in the furnace and under control during the operation of melting. Incidentally, the requisite quantity of silicon can be applied by using iron sufficiently high in the same to produce the initial bath.

Mixing Iron By Analysis.

BY W. G. SCOTT.

THE CUPOLA MIXTURE.

In the April number of THE FOUNDRY there appeared a photo-engraving of a mixing card representing an actual cupola mixture as made in the J. I. Case Threshing Machine Co.'s foundry.

This foundry is managed by Mr. E. H. Walker, who is a practical up-to-date foundryman, with years of experience, and who is well known throughout the country as an expert on gray-iron castings.

The mixing cards are made out by Mr. C. D. Rees, who is associated with Mr. Walker, and has charge of the mixing.

After the mixing card has been approved by the foundry foreman a duplicate card is sent to the chemist for future reference, consequently the foundryman, mixer and chemist working in harmony are reasonably sure of avoiding any serious error in their calculations.

An ingenious system of inspection of the castings in regard to defects, hardness, etc., is of untold benefit in regulating the mixtures from day to day.

This method was instituted by Mr. G. W. Morris, the superintendent of the works, who receives one report, and the foundry foreman another, by which means the physical defects may be corrected on short notice.

I mention these facts as it has a direct bearing on the manipulation of the cupola mixture, to be explained further on.

In charging the cupola, the first step is to start a fire with a little kindling and about one-sixth of a cord of hard wood.

When the fire is well started, the bed of coke (1,800 lbs.) is introduced, and when this is well lighted or of an even red heat all over, 400 lbs. more of coke is thrown in the cupola, making in all a bed of 2,200 lbs., which reaches to about 18 inches above the tuyeres.

On the bed a few pieces of scrap iron or sprues are then placed to prevent the first charge of pig iron from sinking down into the coke, when this scrap is evenly distributed over the bed the first charge of pig iron (3,000 lbs.) is thrown in, care being taken to distribute it evenly and in a circular form.

On top of this is placed the 300 lbs. of steel rail, then follows the home and foreign scrap, constituting the first charge of 6,000 lbs.

The second charge consists of the following material in the order named:

450 lbs. of coke.
2,000 lbs. of pig iron.
200 lbs. of steel rail.
1,800 lbs. of scrap.

The third charge is built up in the same way, coke first, then the pig iron, steel and scrap.

The limestone flux is not added until about the sixth charge; it goes on top of the scrap iron.

Our cupola is lined to 62 inches diameter, and is charged to the door, about 12 tons of iron being required to bring the burden up to this point.

As a rule, the blast is now ready to be turned on, and in a very short time the first charge begins to melt and settle down through the fuel onto the sand bottom.

When, according to the judgment of the cupola tender, sufficient iron is melted, it is tapped out into a large ladle holding about 2,000 lbs.

The molten iron is delivered to all parts of the foundry by means of an overhead trolley system, which carries the large ladles to the different floor sections where it is transferred to smaller ladles for pouring light work, or poured into a crane or bull ladle for heavy work.

By using a large ladle to catch the tap out, and knowing the weight, it is possible to keep track of the different charges and tell at any time the grade of iron poured off.

Test bars are taken from each grade of iron; thus,—No. 1 test bar will be poured from the fifth large ladle of iron tapped out and will represent the quality of iron in the No. 1 mixture.

No. 2 test bars are poured from anywhere between the twelfth and fifteenth ladles.

No. 3 test bars between the twenty-fifth and thirtieth ladles.

Care is taken not to pour a test bar from iron forming the junction between two different mixtures (i. e., between 1 and 2 or 2 and 3), for the reason that there is always an admixture of No. 1 and No. 2 in the ladle taken at the junction of the two different mixtures.

The foundryman pours this ladle of mixed iron into certain castings where a slight variation in silicon, sulphur, etc., is of no importance.

As a rule, a test bar or a casting poured at the junction of a mixture will show on analysis the exact proportion of the two mixtures.

When only one grade of iron is made, no attention need be paid to the number of ladles, yet it is better to take the first test bar some

little time after the iron has commenced to run, the very first ladle or charge being different in many respects from the following charges, a fact which will be explained later on. The second test bar may be taken from near the middle of the heat, and the third bar from near the end of the heat.

Cupola practice varies under the management of different foremen; it also varies to a great extent according to certain conditions which present difficulties that necessitate certain changes in order to get the iron out on time.

The above description of cupola practice is merely presented to show how the grades of iron are kept in view and where the test bars are taken from.

TEST BARS.

Every foundryman considers it absolutely necessary to make some kind of a physical test of his cupola mixture, consequently and in accordance with such ideas we may have a *transverse, tensile, torsional, chill, shrinkage,* and *drop test.*

In some cases one test only is considered sufficient, while in others it is deemed necessary to resort to all the tests possible.

In addition to this may be mentioned the fact that no two foundrymen agree perfectly in respect to the size and shape of the bars used for a physical test.

All of the foundries connected with this laboratory have adopted similar test bars, which may be described as follows:—

Malleable iron test bars are *round*, with a diameter of eight-tenths of an inch (equivalent to an area of one-half square inch), and about fourteen inches long.

One bar is to be poured from the first part of the heat, the other from the latter part of the heat; these bars are numbered one and two, and are annealed along with the regular castings from this particular melt. According to specification, these bars must be furnished with a tag bearing the date of the melt and stating the time of annealing.

In addition to the annealed bars, we have two "test wedges" of white iron, one from the first part of the heat, and one later on, or, more strictly speaking, one wedge from the "low" iron and one from the iron when it is "high."

The white iron wedges are eight inches long, one inch square at one end and taper down to a thickness of one-eighth of an inch, by one inch in width.

The wedges are used for a "shock" or "drop" test, and are placed on supports six inches apart. This is a most valuable test, as will be shown under the head of malleable iron.

The annealed test bars are designed for a tensile and torsional test; occasionally they are subjected to a transverse strain and the drop test.

Gray Iron test bars are molded *square;* are four in number, and are designed for several different physical tests.

These bars are one inch square and thirteen and one-third inches long.

Three of the bars, one from the first part of the heat, one from the middle, and one from the latter part of the heat, are used for determining the *transverse strength, deflection, shrinkage,* and *chill*; these three bars are cast in an iron yoke.

The fourth bar, cast in sand without a yoke, is used for determining the *tensile* strength.

With each of the three yoke bars, and in the same mold, is cast a block three inches square and seven-eighths of an inch thick, from which borings are taken for a chemical analysis of the iron.

To the best of our recollection, this method of casting the bars in a yoke, is the invention of Mr. W. J. Keep, of Detroit.

The object of casting in a yoke is to measure the shrinkage.

With the thresher people, the matter of shrinkage is an important consideration as too much, or too little shrinkage, will cause the loss of cylinder concaves by throwing the teeth out of line so that they will not pass the cylinder teeth.

The yoke used in connection with the Nos. 1, 2 and 3 test bars, is exactly 13.333 inches between the shoulders; this gives a test bar long enough to be placed on 12-inch supports for a transverse test; furthermore, it will be seen that by deducting one-tenth of the length (1.333 inches) we have an exact theoretical length of 12 inches, *therefore, if the shrinkage be measured on the yoke bar, and one-tenth be subtracted, the result is the shrinkage per foot.*

The sketch Fig. 1 gives a better idea of the method of molding these yoke bars than could any written description, and is a view looking down on the drag or lower half of the mold.

When the test bars are sent to the laboratory they are placed in a shrinkage gauge somewhat similar in principle to the yoke and the

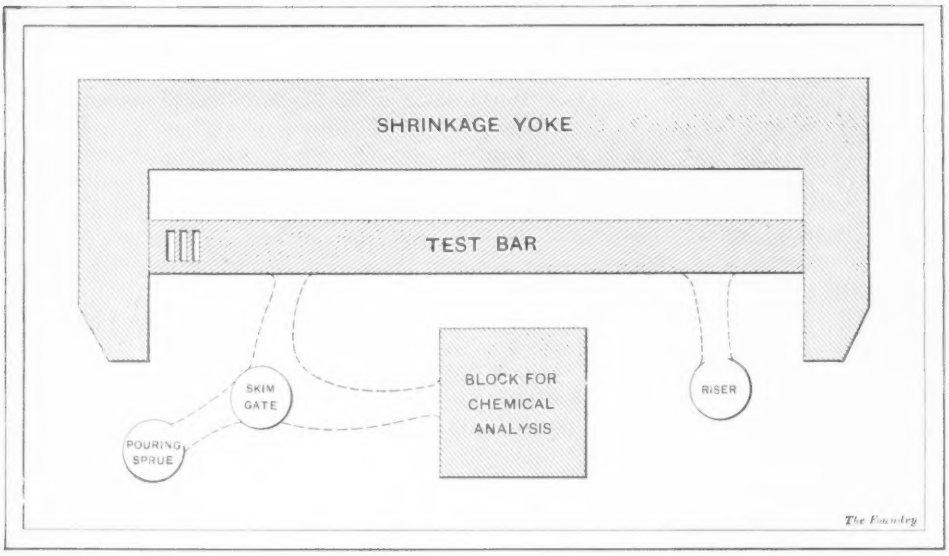


FIG. 1.

shrinkage measured by means of the micrometer as shown in Fig. 2.

When the bars are cast in a yoke it is obvious that the ends coming in contact with the cold iron of the yoke, will receive a certain degree of *chill*, according to the chilling properties of the mixture, and furnishes a ready means of measuring the *depth of chill*.

fluid ounces of distilled water, then adding 1 fluid ounce of strong muriatic acid.

Make the mixture in an earthenware jar, as the heat of the mixture will be liable to break a glass vessel.

Never pour the water into the acid, but *add* the sulphuric acid slowly in a thin stream and stir well.

FIG. 2.

In order to get the exact measurement, it is better to get a print from an etching in the following manner:—

Grind off one side of the chilled end of the bar, using an emery wheel or grind-stone, then polish with flour of emery to remove scratches. Wash the polished surface with weak ammonia and then with clear water to remove the grease, etc., after which place in an etching solution for about fifteen minutes.

The etching solution is made by pouring 3 fluid ounces of strong sulphuric acid into 9

When the piece is well etched, rinse in clear water, then wipe dry.

With a printer's roller give the face of the etching a coat of ink, then by means of a letter press or by bearing down hard with the hand, you can get a print showing the chill.

Fig. 3 is an exact reproduction of an etching showing the chill on our No. 1 test bar.

The tensile and transverse tests of our bars are made on a Riehle Bros. automatic screw-power testing machine, with a capacity of 50,000 pounds.

The tensile test is made with a span of 8 inches between the grips.

The transverse test is made by applying the weight in the middle of the bars which rest on supports exactly 12 inches apart.

Deflection is taken with a deflectometer.

The bars are all micrometered, and the

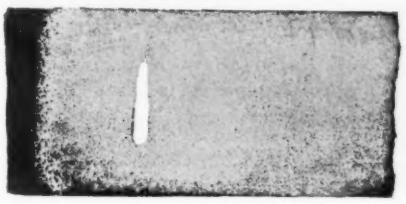


FIG. 3.

breaking strain figured to the square inch.

In making a transverse test of a square bar, it makes a considerable difference which way the bar is placed on the supports; if the gate side is placed up, the bar will show a greater strength than where the gate side is placed down.

A series of several hundred experiments in this line gives from 8 to 10 per cent increase in strength with the gate up.

The same thing is true of bars subjected to the drop test. By placing the gate on the side when making a transverse test, we expect to get an average strength.

Our drop test machine is built on the principle of a pile driver, with two upright posts, 12 inches apart.

A frame 12 inches wide, and 18 inches long, slides up and down between the upright posts; on the lower end of this frame is attached the iron striking block made in the shape of a wedge with an oval hardened steel face, one-half inch wide.

The frame and parts weigh 10 kilos, or about 22 pounds. The frame or weight is pulled up to a certain height and then automatically released by means of a suitable trip. A fall of one inch is equivalent to 22 inch pounds, a two inch drop is equivalent to 44 inch pounds, and a drop of 12 inches in calculated as 264 *inch* pounds or 22 *foot* pounds.

We do not report drop test determinations in the metric system of figures, as very few business men understand such figures, nevertheless, the drop test is built on the metric system and has a scale divided into metres, centimetres and decimetres.

In testing cast iron under the drop, we place the bar or wedge, as the case may be, on supports either 12 or 6 inches apart.

The *number of blows*, total height of the fall, i. e., *total drop*, and the *equivalent inch pounds*, are reported in such a test.

With a one-inch-square test bar placed on supports 12 inches apart, we start with a 3-inch drop, and increase the height of the fall or drop, by one inch each time until the bar is broken.

For example, we may illustrate the method on paper as follows:

First drop (1 blow)	3 in. fall,	66 in. pounds.
Second drop (2 blows)	4 in. fall,	88 in. pounds.
Third drop (3 blows)	5 in. fall,	110 in. pounds.
Fourth drop (4 blows)	6 in. fall,	132 in. pounds.
Fifth drop (5 blows)	7 in. fall,	154 in. pounds.
Total	25 in. fall,	550 in. pounds.

This would be reported as five blows, a total fall of 25 inches, and equivalent to 550 inch pounds.

This is our method of making the drop test, but it does not necessarily follow that it is the best method; some experimenters prefer a given height for the drop and repeat the fall until rupture occurs, in which case the *number of blows* is the main feature.

Castings in actual service are generally subjected to shock, consequently it seems to us that more attention should be given the drop test method of determining the strength.

It has been found from numerous experiments that a square test bar having a *tensile strength* of, say 24,000 lbs., will have a *transverse strength* of about 2,400 lbs., and a *shock resistance* of 240 inch pounds.

In regard to the torsional test, we shall not go into details further than to state that the machine registers the strength required to *twist* the bar, also the angle of torsion; this test is seldom used on cast iron but is of value in testing pipe, etc.

The above remarks apply exclusively to methods and machines used in this laboratory and if compared with other records the conditions should be similar in every respect, otherwise the comparison is of little value.

A physical test of the bars from each foundry is made every day, a chemical analysis twice a week.

The regular physical test includes the following determinations:—transverse strength, deflection, shrinkage, and tensile strength.

On the two days when a chemical analysis is made, the bars are subjected to a drill test to determine the degree of hardness.

This test is of practical value, and if conducted on the right lines it gives one a general idea as to the working quality of the iron.

The late Mr. Chas. A. Bauer is the originator of this method, and several years ago made arrangements with the writer to carry on a series of experiments in connection with the Warder, Bushnell & Glessner Co.'s tests. To Mr. Bauer belongs the credit in developing this easy method for determining the difference between imaginary hard iron and actual hard iron.

A description of this machine was printed in THE FOUNDRY previous to the demise of Mr. Bauer, consequently there is no need to repeat the description.

The only changes made on the machine here is in the attachment of an automatic electric revolution counter, and the use of special twist drills in place of a flat drill. We use a ⅜ twist drill made by the Cleveland Twist Drill Co.; this concern very kindly made us a special drill of superior quality and temper for this particular test, by which means it is possible to bore three test bars and the standard plate without changing or sharpening the drill. The test plate is standardized at 222 revolutions, consequently by boring the standard piece along with the three bars we get a factor for the correction due to slight variations in temper or the sharpness of the drill, thus: If the standard plate shows 233 revolutions in place of 222, the factor for correction would be .95 (222 divided by 233 equals .95) and the revolutions determined on each bar must be reduced accordingly.

A great many tests were made on various metals to determine the relative hardness so that one might form some idea as to the actual hardness of cast iron; we submit a copy of this result in order to show the variation according to the Bauer Drill Test. See Fig. 4.

The figures here given are the average of more than one hundred borings from each different metal.

These metals were all analyzed, and are the metals used about this plant, so of course are of no interest to others except the determinations on lead, tin, aluminum, antimony, zinc, copper and iron.

Our mode of conducting the several physical tests has been hastily described, therefore we

BAUER DRILL TEST FOR HARDNESS.

J. I. CASE THRESHING MACHINE COMPANY'S LABORATORY.

Showing the number of revolutions in boring exactly one-half inch of metal, using a three-eighths inch twist drill. The pressure on the drill being 160 pounds and running at 350 revolutions per minute.

Various Metals.	Revolutions.	Various Metals.	Revolutions.
Lead (Pig)	7	Hard Babbitt (Rumely)	18
Tin (Block)	13	Antimony Lead "	12
Aluminium	89	Phosphor Tin "	13
Antimony	106	White Metal	8
Zinc (Spelter)	70	Wrought Iron	400 to 600
Copper (Ingot)	160		
Yellow Brass	85	Extra Soft Cast Iron	150 to 200
Stereotype Metal	12	Soft "	200 to 250
Antimony Lead	12	Medium "	250 to 350
Phosphor Bronze (Red)	253	Hard "	350 to 500
Phosphor Bronze (White)	164	Extra Hard "	500 to 700
Hard Bronze (J. I. C.)	244	Too Hard to Bore	1000 to .....
"A" Babbitt "	11		
"C" Babbitt "	12	Standard Test Bar	222

FIG. 4.

may return to the original subject of the test bars obtained from the cupola mixture previously described.

The printed form Fig. 5 shows the results as determined in the regular semi-weekly analysis.

It will be noticed that there is very little difference between the "Estimate" and the "Actual Analysis." This is not the rule, however, as there is generally a greater variation in silicon, in fact if the mixer comes within fifteen points either way, it is considered close enough.

Whenever the foundryman considers it necessary he asks for a complete analysis, in which case the chemist must report the depth of chill, torsional strain and the result in inch pounds for the drop test, for a complete physical analysis; likewise a chemical analysis of phosphorus, manganese, combined and graphitic carbon.

In some cases it is deemed necessary to take four test bars from each grade of iron and report the *average* of each grade; this is the better plan, but it is too much work and too much theory for every day practical work.

An *estimate* of the three grades of iron shown on the mixing card for Feb. 21 figures out in a complete chemical analysis as follows:

Complete *estimate of* No. 1 iron.

Silicon	1.70 per cent
Sulphur	.085 per cent
Phosphorus	.612 per cent
Manganese	.62 per cent
Total carbon	3.14 per cent

The actual analysis gave 1.64 per cent of silicon, .089 sulphur, .690 phosphorus, .55 manganese, .70 combined carbon, and 2.25 per cent of graphitic carbon.

Drillings from this iron were sent to two other chemists to be checked, the report returned was as follows:

	Chemist No. 1.	Chemist No. 2.
Silicon	1.60	1.68
Sulphur	.088	.094
Phosphorus	.688	.682
Manganese	.60	.57
Combined carbon	.71	.70
Graphitic carbon	2.22	2.31

J. I. CASE THRESHING MACHINE COMPANY.

CHEMICAL AND PHYSICAL LABORATORY.

CUPOLA MIXTURE. Date of Heat Feb. 21 1901

SIZE OF TEST BAR 1 × 1 × 12 IN.

Test Bar.	Transverse Break.	Deflection. Inch.	Shrinkage. Inch.	Chill. Inch.	Tensile Strength.	Hardness. Revolutions	Fracture.
No. 1	2690 lbs.	0.12	0.151		lbs.	301	Close
No. 2	2420 lbs.	.10	.142		lbs.	265	Medium
No. 3	2500 lbs.	.11	.121		24800 lbs.	209	Close
Average	2537	.11	.138			258	

CHEMICAL ANALYSIS. Date of Test Feb. 22 1901

Test Block.	Silicon.	Sulphur.	Phosphorus.	Manganese.	Carbon.	Graphite.	Estimate.
No. 1	1.64	.089					Si 1.70 S .085
No. 2	2.09	.093					Si 2.00 S .091
No. 3	2.42	.079					Si 2.50 S .084

2.05 — .087

Keller CHEMIST

FIG. 5.

Complete *estimate* of the other grades and home scrap, figures out as follows:

	No. 2 iron.	No. 3 iron.	Scrap.
Silicon	2.00	2.50	2.00
Sulphur	.091	.084	.082
Phosphorus	.702	.721	.696
Manganese	.43	.53	.56
Total carbon	3.28	3.34	3.28

The actual analysis of these irons was close to the estimate except in the case of total carbon, No. 2 showing 3.20 and No. 3 showing 3.49 per cent.

When there is a radical difference between the estimate and the actual analysis, especially in the case of silicon and sulphur, we may infer that the pig iron was not properly sam-

pled or that the cupola charges were not correctly weighed or mixed. It happens quite often that the temperature of the cupola and the blast influences this result, but it is not a continuous result, therefore a continued variation in the estimate and the actual analysis points to the first cause.

The object of making a chemical mix is to improve the quality of the iron, obtain a similar composition in like grades, regulate the amount of scrap, and cheapen the product; a chemical mix, however, is not the whole thing, and if a person thinks for a moment that such a mix will remedy all the evils in connection with cast iron, they will be much disappointed.

Blow holes and dirty iron, scabs, kish and spongy spots are not always due to the composition; in some cases the physical manipulation of the molten iron cuts quite a figure, also the molding and many other details connected with the foundry proper, consequently it is a mistake to ignore the practical foundryman and pin all faith to the chemist; let them both do their part, work in harmony and aim to get results.

Every man's opinion is entitled to respect even if he is only partly right, therefore let the foundryman run the foundry and the chemist assist him by means of the laboratory.

Fires.

The foundry of Andrew N. Peterson, at Brooklyn, N. Y., was totally destroyed June 18. Mr. Peterson has secured the foundry lately vacated by the Braid Bros. Co., and is turning out castings at that place.

A loss estimated at $100,000 was sustained in a recent fire by the Montreal Pipe Foundry Co., at Lachine Falls, Quebec. The Montreal Carwheel Works, also owned by Messrs. Drummond, McCall & Co., and their associates, is also damaged. The plant at Lachine is worth considerably upwards of $200,000. The members of the firm stated this afternoon that fortunately the fire would not interfere with the filling of their orders, though, of course, it would entail some loss to them. The shops owned and controlled by them at Londonderry, N. S., and Three Rivers, will be able to take care of their orders for the time being. It is the intention of the firm to rebuild immediately.

The Kansas City Hay Press Co., of Kansas City, Mo., suffered a loss of $15,000 by the burning of its foundry and pattern shops July 8. It is reported that rebuilding will be started at once.

CAST IRON NOTES.

Devoted to inquiries from Practical Foundrymen on the subject of Melting and Using Cast Iron. Address all inquiries to W. J. KEEP, care of The Foundry.

Waste of Iron in Cupola Melting.

Every little while I am asked to give the proper amount of waste to be expected in melting. If a large quantity of pig could be melted in a cupola the only loss would be sand on the pig, the slag on the surface or in the pig and the iron spilled about the foundry and thrown away in the cinder. All these are indeterminable quantities and are dependent on the character of the employees. In a foundry making thin castings the loss from spilling is increased.

Some years ago I arranged the weighing so that no mistake could occur, but am no nearer determining the waste question than before.

Our sprues are not milled and I allow 30 lbs. of sand to 800 lbs. of sprues.

As the remelt varies from 35 to 40 per cent of the whole melt the uncertainty is greatly increased. While the weights are correct within half of one per cent, yet at certain times it is feared that the iron will run short and scrap is thrown in in a hurry without correct weights and the month's average is spoiled.

With the conditions and quality of help on a cupola platform it is impossible to determine waste. The result is only the difference between the charged weights and the castings produced and cannot prove any actual loss of iron due to melting.

If a ton of iron made in iron molds was melted and poured into a single casting the only loss would be the iron in the cinder and the scale of the casting might overbalance that and show a gain. We often seem to get out more than we put in.

"Scotch Pig Iron."

Why do some furnaces call their product "Scotch pig iron?"

Answer. To make it sell. Forty or fifty years ago a large portion of American pig iron was made from dense, hard ore found at Lake Superior and at Lake Champlain or in New Jersey. The blast was heated very little and the iron contained very little silicon and made hard castings. Imported Scotch iron made largely from black band ore mixed with our iron made a soft fluid mixture. It was supposed that the black band ore produced these good qualities.

After a while soft hematite ores were mixed with the hard magnetic ores and the blast was made hotter, making iron nearly as good as the imported irons for castings.

Black band ores were found along the soft coal seams of Ohio and were mixed with soft hematite ore found near by, making an iron which was exactly like the Scotch iron and the name Scotch was rightfully given to it. The black band ore was used up years ago, but soft hematites and very hot blast produced pig irons very nearly if not fully as good as before.

It was found about twenty years ago that it was the carbon, silicon and phosphorus that made iron fluid and that by hot blast and silicious ores any desirable composition can be obtained. Scotch iron had an open dark grain and contained about 2.75 to 3 per cent silicon and about one per cent of phosphorus. It was called a scrap carrier because of its silicon.

The term "Scotch" was originally added to irons made from black band ores and is retained by some of those furnaces. It is also used by furnaces making especially soft foundry iron with dark open grain and with silicon near three per cent.

Oil in the Blast Furnace.

"Can crude oil be used instead of charcoal in the blast furnace?" is a question from Texas.

Answer. No. The blast furnace process is three fold. First: to remove the oxygen from the ore. Second: to add carbon to the portion that remains. Third: to melt the carbonized material.

Charcoal, coke or coal, and ore are charged at the furnace top together so that the stack is completely filled with the uniform mixture, cold at the top and at a melting temperature at the tuyeres where highly heated air is blown in. The melted portion is cast iron and fills the furnace below the tuyeres or hearth.

Now see the difference between the action of coal and oil. The oil thoroughly mixed with air and forced into a tuyere would be burned at the end of a burner which would cut a channel clear across the furnace, but would not melt uniformly across the whole interior. Oil is often used in this way to cut out a furnace that is frozen up. With coal evenly distributed the air reaches every particle, producing a uniform melting heat, causing an even settling of the whole contents of the stack. In both cases the product of combustion is carbonic acid gas, which contains all the oxygen that it can hold. In this state it cannot take any oxygen out of ore. With the furnace full of coal, as the carbonic acid gas rises it takes up another portion of carbon and becomes carbonic oxide. It is now able to take the oxygen from the ore in the upper or cooler part of the furnace or to give some of its extra carbon to the ore which has lost its oxygen just before the melting zone is reached. This taking up of oxygen or giving its carbon to the iron turns it again into carbonic acid, but it takes carbon from the fuel so much more readily than it parts with it, or takes oxygen from the ore, that the gas which leaves the furnace top is largely carbonic oxide and is conveyed away in pipes to be mixed with more air to heat boilers or the blast. If the furnace contained no coal and the melting was done with oil the resulting carbonic acid could not be turned into carbonic oxide, therefore the ores could not be changed from oxide of iron to metallic iron and could not be carbonized to form cast iron.

Something New For Foundrymen to Learn.

Every once in a while a prophet bobs up in the foundry business, just as he does in religion, politics or anything else. The foundry trade has been much neglected, but thanks to the *American Manufacturer*, we are in a fair way to make up for lost time. This enterprising journal has discovered a genius, a real wonder, in the person of one William G. Irwin, who knows more about the foundry business than ninety-nine per cent of the foundrymen. If the editor of the *American Manufacturer* ever lets the said William go, no matter what price he asks for the articles he writes about the foundry business, then we shall certainly miss much humorous matter for our columns in the future.

Puck and *Judge* used to have a corner on all the funny things that were said in these United States, but the *American Manufacturer*, hitched up tandem to William G. Irwin, is away ahead of any of the funny things which have been thrown at us in the past.

In order that our readers may not miss a single one of the dew-drops of wisdom which trickle down the aforesaid Irwin's pen, we reprint his collection of new information concerning the foundry business without any alteration whatever. It is as follows:

Foundry Molds and Facing Sands.

BY WILLIAM G. IRWIN

While decided advances in many lines of

foundry practice have been made in late years there has been but little change in the materials or in the preparation of moulds, for while the proportion of the various mould materials differ somewhat according to the castings, yet the composite character of these materials have undergone few if any changes.

The preparation of moulds and the selection of mould materials form one of the most important processes in foundry practice, for the character of the casting is so largely dependent upon the mould that the slightest deviation from the established rule in casting or in the moulds is liable to ruin the whole work, and entail a heavy loss. The foundry moulder of today is a most important factor in the iron and steel industry.

The factors which enter into foundry moulding as practiced today are sand, clays, blackening, coal-dust and cow-hair, and it devolves upon the moulder to select the proper materials and so use them as to produce the proper mould for the desired result. Among the objects aimed at in preparing moulding materials are permeability, the power of resisting the pressure of the metals, and the power to carry a heavy pressure and at the same time resist chemical action.

Sand is the most important factor in the preparation of moulds. It is a material which is not susceptible to chemical action, is a good conductor and freely admits the passage of air, gas, etc., and at the same time gives the mould a great adhesive and resisting power. In foundry practice, sand means new rock sand to which coal dust has been added. This is prepared each day or previous to the construction of the moulds, the sand and coal dust being shoveled upon each other in layers and then thoroughly mixed and run through a screen. The proportion of the coal dust to be added to the sand varies in some cases, the use to which the facing sand is put forming a guide to its preparation. Sand mixtures for moulding purposes are first dried and differ from green sand moulds, sand for the latter is also mixed with coal dust, the composition being somewhat different from the regular moulding sand for the most exacting foundry moulds.

The manufacture of coal dust for foundry purposes, commonly called "foundry facing," forms an important industry in the Pittsburg coalfields. Many big facing mills are now operated by the Pittsburg Coal Company and other concerns, among them the Westinghouse Company, which concern is one of the largest foundry operators in the country. This material is made from coal slack or refuse which is ground in different grades to suit light or heavy castings in green sand, for which purpose it is mixed with sand which has already been mentioned. In casting this coal dust burns out and thus passages for the escape of the air, gas, etc., are formed in the moulds. A clean, pure coal is therefore used in the manufacture of this "facing" material. While the proportion of carbonaceous matter used in the preparation of facing sand varies, it usually consists of one part of coal dust to 75 parts of black floor sand.

Loam in clays comes next to sand in moulding. Plumbago usually forms the blacking used by moulders. A patent article in the shape of pure carbon produced from the distillation of paraffine is also used, as is mineral carbon or lead, and charcoal. In foundry facings feldspar, chalk, iron pyrites, etc., are to be avoided as they are injurious to metals. Mixing machines for the preparation of facings are used extensively and in moulding flasks are always employed. Core and core ventilation is an important feature in the preparation of moulds. Parting sand is used to prevent separated parts of the moulds from adhering. This sand is somewhat lighter in color than the regular moulding sand. Red brick dust, free sand, blast furnace culm and other substances are used for the purposes of the parting sand.

The cast iron moulding silica, magnesia, alumina and metallic oxides are combined in various proportions. Talc or soapstone is an important factor in foundry moulding materials, or rather in the composition of the completed mould. The magnesia through the lime contained in it gives a refractory result as do the metallic oxides. The lime also helps to cement the sand and the alumina gives a plastic and cohesive result and also vitrifies at a high temperature. The silica also has a refractory action.

In steel moulding greater resistance is required on account of the excessive heat. Moulds for brass casting must be free from rock sand. Floor sand, that is sand that has been used, is an important factor in dry sand moulding. For filling up sand one part of floor sand, one part of dry powdered loam, and two parts of rock sand are used. In facing sand one part of powdered loam is added to two parts of rock sand, no floor sand being

used. Core sand for dry sand moulds is prepared by adding on part of good rock sand to one part of floor sand which has been emptied from dry sand moulding flasks.

There are a great many other things in connection with the selection of foundry moulding materials and many of the every day practices in the foundries of this district are most interesting. All kind of castings made anywhere in the world are made in the foundries of this district, these castings running all the way from the heaviest war ordnance and the greatest machinery for industrial and other purposes down to the most intricate and minute iron, steel composition, and other cast articles manufactured and in use today.

Now what do you foundrymen think of Irwin's story? Isn't he pretty good for a green hand? For a man who has got to do something in the foundry trade to make his living he is making a pretty strong bluff.

After telling us that the "foundry moulder" is an important factor in the iron industry, something which the majority of the foundrymen do not believe, Monsieur Irwin informs us that the other factors are sand, clays, blackening, coal-dust and cow-hair.

The way Mr. Irwin tackles the covering of a cow makes us think that he intended to write an article on upholstering furniture and got his trolley twisted. His remarks about the chemical action of molding sand entitles him to two beers hand running.

That sand in foundry practice means "rock sand to which coal dust has been added" will be news to the majority of molders, in fact the man who should try and mold with rock sand and coal dust exclusively would not go far in the trade, unless Mr. Irwin's cow-hair would in some way increase the output.

It is very peculiar that Mr. Irwin should so far have forgotten himself as not to have visited a foundry before he inflicted this brainless essay on "Foundry Molds and Facing Sands" on the publishers. No one who has ever been inside of a shop will say that one part of coal dust is used to 75 parts of black sand or that flasks are always employed in molding.

It is too bad that such a staid and aged journal as the *American Manufacturer* can be persuaded to publish such a worthless lot of tommy-rot. If it is going to so far forget its respectability as to attempt to compete with the humorous papers of the country, it should promulgate an announcement to this effect.

Another journal of mature years, that is occasionally buncoed by contributors who know nothing of the subjects on which they write, is the "Age of Steel." For several years there has existed, under different aliases, a literary "green goods" man in one of the eastern states, who now addresses all of his correspondence from Manila, P. I., evidently in the hope that distance will add strength to his product. The last cargo he unloaded on the docks of the "Age of Steel" and after telling it of the urgent need of junk shops in the Philippines, he proceeds as follows:

Chances For a Metal Foundry.

"But what concerns the junk business more than anything else in this country at the present time is the foundry. A foundry connected with a junk shop would bring to its owners very rich returns. There is a great demand for special castings for all sorts of work. Now that practically permanent peace is established throughout the islands, such manufacturing enterprises as were in existence, and were burned, are now in progress of restoration. In many cases the sugar mill people are rebuilding, and in the reconstruction of the presses and the sugar working machinery there is great need for special parts to replace parts so badly burned and warped as to be useless. In most cases the metal bearings of the journals in the engines and other machinery were run out by the heat, and this requires that new sleeves be cast and put in. The call for sleeves is therefore very great, and these can be readily cast in a foundry attached to a junk works. The sands of the beaches in the Philippines are said to be excellent for making molds, and in many cases the natives themselves have recast metals for service. The natives use the blow pipe for melting the hard metals, and run the molten metal into molds on pretty much the same plan as the American. Brass is, of course, the hardest metal for them to melt and recast in desired forms, but the softer metals are readily managed."

The same author has written absurd articles on other subjects, in the Philippines and elsewhere. This one entitles him to be taken out and shot.

They Have Installations in Minnesota.

The Hutchinson Machine and Foundry Co. installed a new man last Saturday. He is George Taege, a machinist, from Minneapolis. —[Hutchinson, Minn., Leader.

Multiple Molding of Small Steel Castings.

The making of small steel castings has probably been attended with greater difficulties than the casting of small articles in any other metal. When we consider the physical condition of melted steel, this is not to be wondered at. In the first place, steel cannot be handled to advantage in very small quantities, as the metal loses its heat with great rapidity.

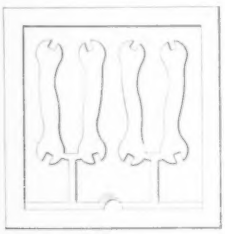


Fig. 1

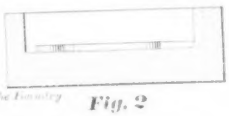


Fig. 2

These conditions led Mr. Jos. W. Harrison, Superintendent of the National Car Coupler Co. of Converse, Ind., into devising a system of turning out small steel castings, which it is our purpose to illustrate herewith.

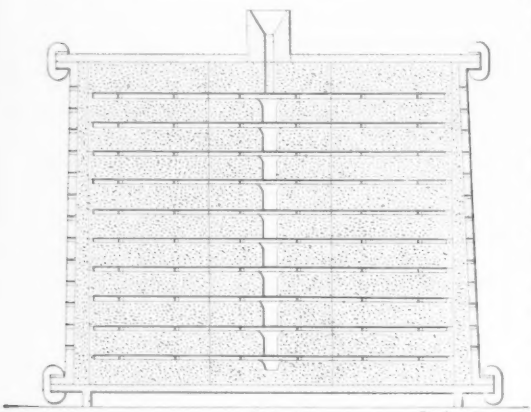


Fig. 3

Figures 1 and 2 show the core box in which is made four wrenches, these cores after being dried are placed together as shown in figures 3 and 4. A general idea of the way these small castings are made in great quantities is shown in the half-tone illustrations. It will readily be seen from figure 3 that this system enables small castings to be made with very little waste, compared with what would take place should each mold be cast separately. The shapes of the gates are such that the mold must be filled from the bottom.

Mr. Harrison says that castings from one ounce to 100 pounds in weight can be made by this process at half the cost of other methods. He has cast 1,000 castings weighing less than 4 ounces each at one pouring in one flask. Of another casting weighing four pounds he has made 500 castings at one time. Out of

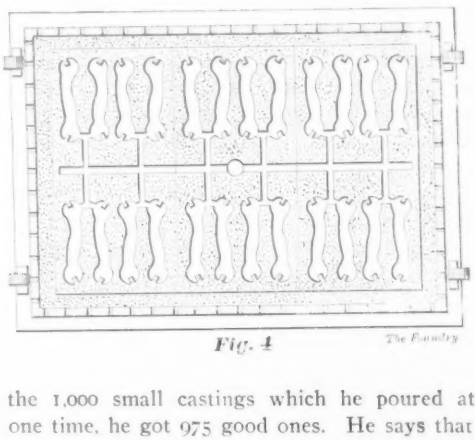


Fig. 4

the 1,000 small castings which he poured at one time, he got 975 good ones. He says that they have a ladle which holds 10,000 pounds of melted steel, and they can deposit the contents of this less than 10 feet from the furnace into these small castings, which cannot be made successfully in any other way.

Are Skilled Workmen Scarce?

Are skilled workmen really scarce, and if so, why? Can this condition be attributed to the decline of the apprentice system? Personally I think not, because the apprentice system has not been abandoned nor is it on the decline. There never was a time when more boys were employed at learning trades than today. There are more shops than ever, and if some shops have to a certain extent abandoned all system of training their apprentices, others have made up for them.

That there is a scarcity of skilled workmen I will not gainsay, but I doubt very much if these were ever more plentiful. I believe, indeed, that a skilled workman of 25 or 50 years ago would make a very poor showing alongside our star workmen of today. Let us take our own trade, molding, for example, and are there not castings made today in green sand that our fathers would not have dreamed of attempting to make any other way than in dry sand or in loam? These are of immense magnitude; perfect and grand to behold.

There always were and always will be botches in any trade and calling. I confess the

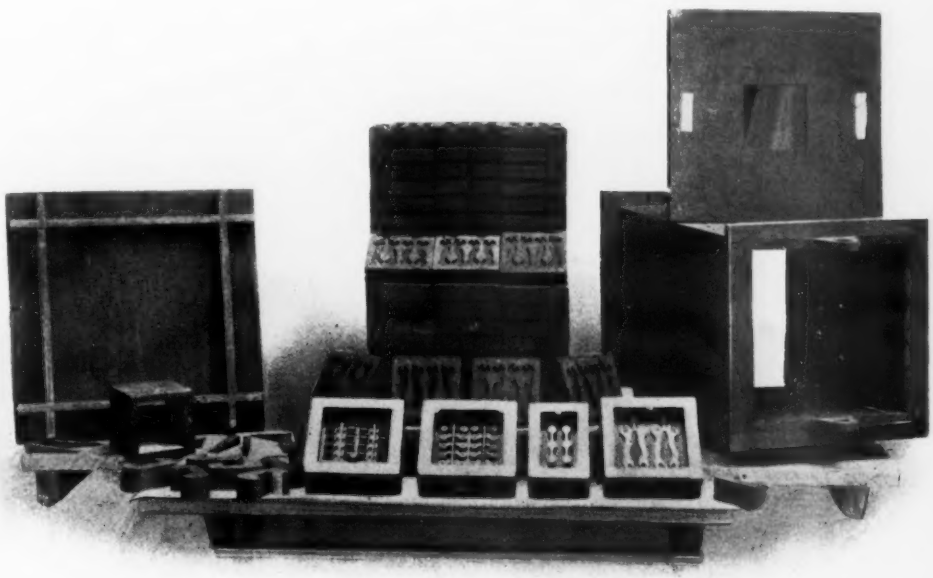
word "botch" does not look nice on paper, but there is no expression that can better designate a careless, slovenly, stupid mechanic. If there are so many inferior men, who are to blame and who are responsible for this state of affairs? I assert fearlessly, the employers themselves. This may seem almost incredible, but it is nevertheless a fact.

In many sections of this beautiful country of ours there are shops which are filled with nothing but apprentices. Every year these send into the labor market a lot of so-called mechanics possessing such poor abilities that if the shops in which they learned the trade have an important job on hand, an outsider must be engaged to do it, as they could not possibly trust one of their own graduates with the same.

The trouble with many a shop is this: They take on boys ostensibly to teach them a trade, but instead of doing so have put them on one machine or keep them doing one class of work, until their time has expired, where no opportunity at all is offered them to acquire a knowledge of the technical points of the trade at which they are working. This is the main reason why so many inferior men may be found in a trade. The question arises, how can this be remedied, and by whom? How can we become a nation of first-class mechanics? The remedy is very simple, and the employer is the doctor.

When a boy is taken as an apprentice he should be given a fair trial of say three months. The foreman or the employer, if they be observing men, will soon see what is in that boy. If he shows a disposition to take more interest in prize fights, foot races, baseball or in ten cent novels, if he will yawn and stretch when the bell rings to start to work, if he will be found outside the shop with his coat half on before the third tap of the bell at quitting time, if he is in the habit of running around the shop half an hour at a time hunting something he has not lost or does not want, if he comes into the shop in the morning with blood-shot eyes showing the effects of debauch, the sooner that boy is dismissed the better it will be for any trade. His only ambition is to watch the clock, and wait for quitting time to come around. These are the boys who worry in their three or four years, and nominally they are mechanics, but practically they are only "botchers," and can never be trusted with a piece of work that is particular or wanted in a hurry.

It is said that the veteran showman, Dan Rice, had a goose he tried to train, but the more he labored with the goose the less the goose knew, and so it is with some boys, and



MULTIPLE MOLDING OF SMALL STEEL CASTINGS.

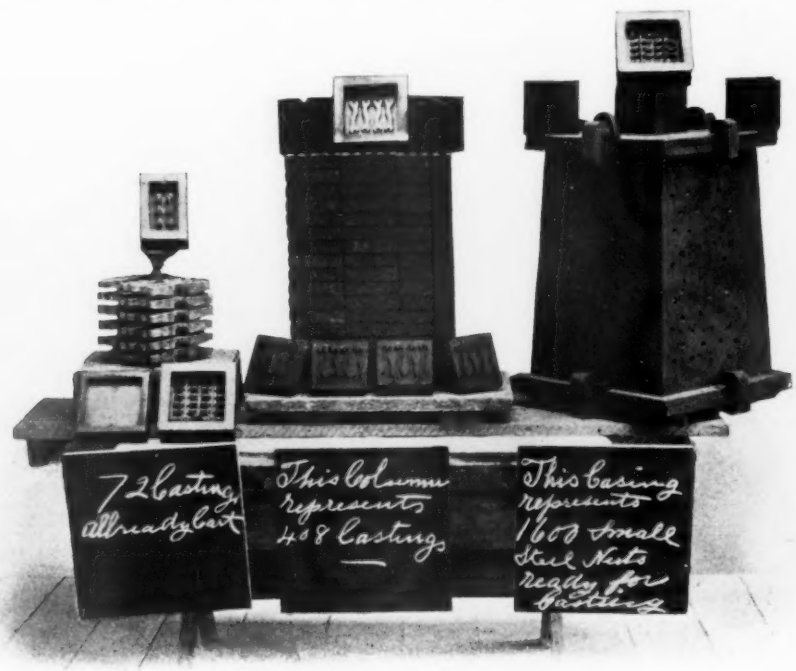
to attempt to retain these boys is a waste of time and expense. Keeping such material is what fills the market with inferior mechanics, who are dear at any price. They are better qualified to run a wheelbarrow and pick and shovel than to work at anything that requires judgment and skill.

I will relate another instance which shows what helps to turn out inferior mechanics. I know a large manufacturing company which does an extensive business. All of their departments are filled with apprentices who get nothing but the plainest kind of work. Annually there is a lot taken in and another lot pushed out, the latter not being in any sense of the word mechanics, but young men who were led to believe that if they served A. B. & Co. so many years they would learn the trade they desired. After serving their time at wages scarcely sufficient to clothe them, they find to their sorrow that they have not sufficient knowledge of the trade to enable them to go into any other shop and demand a journeyman's wages. Instead of changing these boys from one job to another they are kept on one or two jobs, and how can it be expected to have the market filled with experienced men when our manufacturers persist in teaching trades after this manner? It may pay the employer in a pecuniary way, but to say the least it is an injustice to the boy.

The best way to elevate any trade and to have it composed of men who will be an honor thereto is for the employers to carefully examine those they intend to employ as apprentices, securing intelligent, hardy, sober, honest, industrious and ambitious boys, qualified in every way to become a valuable acquisition to the shop and trade.

The employer should be prepared to furnish the apprentice with such a class of work as will compel him to use his thinking powers, and also stimulate his ambition. As soon as he is able to do a certain class of work speedily and accurately, then he should have a change, and this policy should be kept up until by the time he has served his four years he will be a credit to himself and the trade.

The employer should insist on having apprentices serve 300 days a year, failing in which they should be compelled to put in the days they have been absent at the end of the regular term. This would be an incentive to the boy to stick to the shop and hasten through his time instead of playing off sick or being absent through one excuse or another. As a


72 Casting already cast
This Column represents 408 Castings
This Casing represents 1603 Small Steel Nuts ready for Casting

MULTIPLE MOLDING OF SMALL STEEL CASTINGS.

general rule I think the foreman does not pay enough attention to the boys in the shop. As long as he plods along on plow points and flanges and does not kick the foreman seems to be satisfied to let him go along in his own way. The boys we accept as apprentices should be looked after and carefully instructed, their treatment should be courteous, and while these things will take a little time, it will pay a man, and there will then be less need to cry that skilled labor is scarce. I make the assertion that the more good mechanics we make at home the less we will have to import, and the sooner we make more of our own the less trouble there will be between labor unions and employers.

F. B. SHAFFER.

Elizabeth, N. J.

MULTIPLE MOLDING OF SMALL STEEL CASTINGS.

Personal.

August Amman recently completed his twenty-fifth year as foreman of the foundry of John J. Radley & Co., New York City.

Henry De Tour, for fifteen years foreman of Braid Bros. Co.'s foundry, at Brooklyn, N. Y., has taken charge of the Columbia Foundry in the same city. The Braid Bros. Co. has retired from business.

William Robinson has accepted the foremanship of Mill & Ferguson's foundry, at Hoboken, N. J., also known as the Fox Hill Foundry.

Herbert Lee is now in charge of Russell & Co.'s foundry at Massillon, Ohio.

George Shapland has been engaged as foreman of Brennan's foundry, at Creston, Iowa.

John M. Kelly, for some years foreman of the Buckeye Engine Co.'s foundry, at Salem, Ohio, resigned that position lately.

George H. Wadsworth, for six years general superintendent of the Falls Rivet & Machinery Co., of Cuyahoga Falls, Ohio, has resigned to accept the management of the Wadsworth & Sherwin Improved Core Machine Co., of the same place.

W. F. McGuire has been placed in charge of the Cleveland Pneumatic Tool Co.'s office, at 15 Cortlandt street, New York.

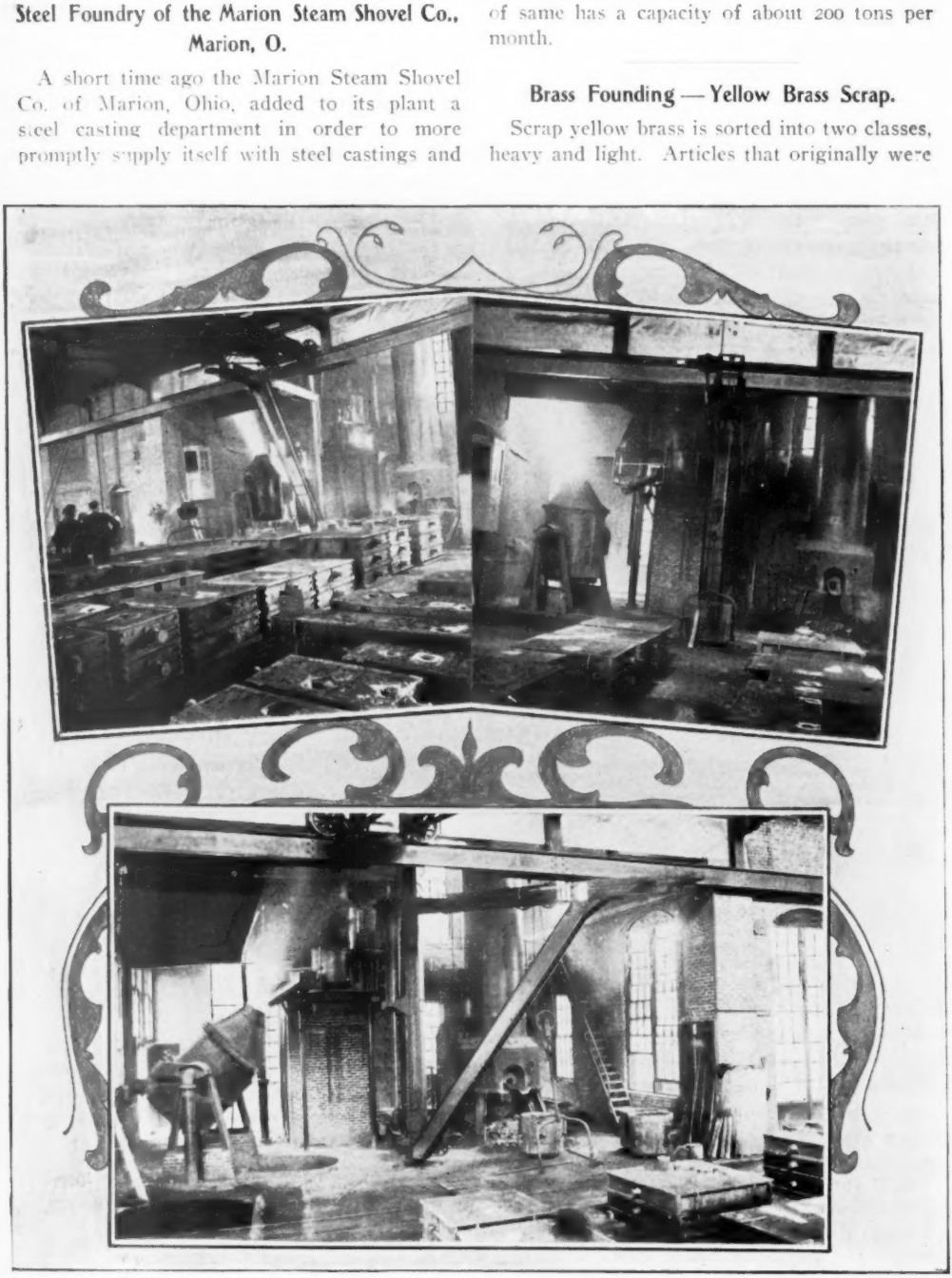
J. C. Phillips, foreman of the Kelly & Jones foundry at Greensburg, Pa., has resigned and accepted a similar position with the Best Mfg. Co. of Pittsburg.

L. M. Moffett has taken charge of the foundry of the Dimmick Pipe Co. at Birmingham, Ala.

C. S. Johnson, formerly general manager of the Pittsburg Steel Casting Co., in Rankin, Pa., has resigned his position, and will become general manager of the works of the Monongahela Manufacturing Co. in Monongahela City. The new position is an important one, the concern turning out a large number of hoisting and hauling engines.

Steel Foundry of the Marion Steam Shovel Co., Marion, O.

A short time ago the Marion Steam Shovel Co. of Marion, Ohio, added to its plant a steel casting department in order to more promptly supply itself with steel castings and also to be assured of a high quality of castings. We show herewith some illustrations from this part of the works. The size of the foundry is 225x80 ft. and the steel casting department of same has a capacity of about 200 tons per month.



STEEL FOUNDRY OF THE MARION STEAM SHOVEL CO., MARION, O.

Brass Founding — Yellow Brass Scrap.

Scrap yellow brass is sorted into two classes, heavy and light. Articles that originally were cast are called heavy scrap, and rolled material makes light brass scrap. Where scrap is used in making castings of red brass, or bronze, it is always desirable, unless the work is of low

grade, to add a certain amount of new metal to each heat to give life to the whole, the amount of new metal being according to the quality of the intended castings. With light yellow brass scrap, this is not so important, but it is often desirable to add considerable new metal when heavy scrap is used. The reason for this is that the heavy or cast scrap carries more oxide into the metal than the light or rolled scrap; then, again, the composition of cast scrap is more variable than the rolled. It is very difficult to sort and classify yellow brass scrap, as it all looks alike, and all yellow as you view it in the scrap pile. Some of it may be composed of good honest copper and zinc, and some, again, of copper and zinc, and as much lead as it will carry. Then, we may discover iron or aluminum in our castings when they come out of the sand, and it is of course impossible to tell what particular piece of scrap did the mischief. This, however, is one of the chances we must take when using scrap material.

If the castings turn out discolored black, a little phosphorus is generally effective in dealing with this trouble. Stir in a piece about three-quarters of an inch in length to 100 pounds of metal just before pouring. If the discoloration is of a bluish white, aluminum has caused the trouble, and phosphorus will not remove this, but the tumbler may, and if it does the aluminum will not injure the castings, provided there is no "dirt" or "flaky" spots visible on them.

If there be dirt, it is not always the metal that is to blame; for the dirt may be sand cut from the surface of the mold or the gate. Should this be the trouble, you can caution the molder and use up the defective castings among the gates as usual. If the trouble is caused by flaky spots, however, they will only reappear if the same metal is cast over again; so do not waste time with it, but portion out the defective metal among new material in succeeding heats. There is a saying that "there is never an effect without a cause." This is both; the effect of aluminum and the cause of anxiety. Copper, or any of its alloys, as well as yellow brass, is liable to show this defect when aluminum is present. When aluminum comes into contact with any metallic oxide, except magnesium, and heat is applied the aluminum greedily seizes the oxygen from the other metal and unites with it to form oxide of aluminum. When there is sufficient oxygen to form a combination with all the aluminum, the other metal is left in a state of purity and the alumina floats on top as a slag. The thing desirable, therefore, is to know exactly how much oxide is dissolved in each heat, and add just sufficient aluminum to reduce it. In order to determine this, it would be necessary to take an analysis of each pot of metal. As the oxide of copper is a variable quantity, this of course is not feasible in ordinary practice, so that the employment of aluminum as a deoxidizer is not advisable, however, because its presence in the metal causes new troubles that are more difficult to contend with than the copper oxide.

When aluminum is alloyed with copper, to form aluminum bronze or brass, there is always a difficulty in making clean castings, and many schemes have been devised to prevent oxidation in transferring the metal from the furnace to the mold. As the film of oxide, which forms on the surface when the metal is exposed to the atmosphere, cannot be detected, in ordinary pouring it enters the mold, and, being lighter than the metal, it will be found on the upper surfaces of the casting generally gathered in one or more places where the movement of the metal has deposited it. In appearance these defective places often suggest the idea that the metal had saponified in pouring, forming a lather much like soap-suds, which had been flattened out against the upper surface of the mold by the pressure of the fluid metal behind it. Sometimes the metal can be picked off these spots in flakes or splinters by the point of a knife. Generally they are a little whiter than the sound metal externally, and appear to the writer to be composed of an alloy of copper, aluminum and oxygen. According to a well-established chemical law, all bodies unite with each other in certain definite proportions, which proportions are constant. Aluminum combines with oxygen to form oxide of aluminum, or alumina, in the proportion of two atoms of aluminum to three of oxygen. This oxide is very hard and resembles emery, and when the combination takes place in alloys of copper and aluminum, it would float on the top as a slag, and could be removed or held back by the skimmer. Probably this action does not take place until all the oxide in the copper is abstracted, a small proportion of the aluminum being lost in the process. But the aluminum is still in excess and looking for more oxygen; so when the surface of the molten metal is exposed to the atmosphere, chemical action takes place, and results in the

formation of a substance which is not alumina but which may be a triple union of oxygen, copper and aluminum, and is the cause of the trouble we have been considering.

To avoid this trouble, oxidization must be prevented. In casting large pieces of aluminum bronze this is often attempted by bottom pouring. A hole is made in the bottom of a crucible which is of sufficient size to take all the metal necessary for the casting (or more than one crucible is used if necessary). A bar of iron insulated by fire-clay or plumbago baked on is fitted to the hole as a plug, the crucible when cold is bedded above the pouring head of the mold. Before pouring it is removed, heated cherry red, replaced in position over the head, the hole plugged by the hot iron bar held vertically in the crucible, then the metal is poured in, and when at the right temperature the plug is removed and the metal enters the mold, the stream coming into contact with no more air than the mold contains. Flowoffs are placed to take care of the surplus metal. If the work is too small to adopt some such expedient as the foregoing and yet causes trouble, give up the job or change the metal. The writer has known a firm to spend hundreds of dollars in endeavoring to make castings of aluminum brass, and, it is safe to say, nothing would tempt them to try it again. They paid for their experience and changed the metal. Another firm has invested thousands of dollars trying to deoxidize copper by means of aluminum to obtain a metal solid and possessed of a high electric conductivity. As a result of many expensive experiments, they have established a rule that fixes the amount of aluminum to add to a given amount of copper, in which they have absolute faith, and in spite of failure after failure, caused by flaky spots, they are hoping and persevering, laying the blame on the molders and the furnacemen and everything but the right thing, the aluminum. We will now turn to the consideration of the brass scrap, trusting that the importance of the subject will be sufficient excuse for this digression on the effects of aluminum on copper and its alloys.

As before stated, it is not generally necessary to mix new metal with light yellow brass scrap, because rolled metal is uniformly of good quality and generally very little oxidized. Its greatest drawback is its lightness, which makes it difficult to handle when melting down, as it takes so much of it to fill a pot that it keeps a man busy charging. It should never be charged loose, as it is impossible to prevent some of the metal from falling outside of the pot into the fire, where it disappears like a flash, making the percentage of loss large. It should be pounded into balls of a size convenient to enter the crucible. The iron mortar in which it is usual to pound rosin will suggest itself as being suitable for this purpose. There is considerable loss in making and melting yellow brass, as the zinc is a very volatile metal at high temperatures. It combines with oxygen to form zinc oxide, which fills the shop with smoke and floats around in little flakes. With the most careful melting this loss amounts to one and a half ounces in three pounds of metal.

Careful melting means to keep the surface of the metal covered with some flux, such as charcoal, glass, etc., and to keep the temperature of the metal below the smoking point as much as possible during charging. Some furnacemen require considerable watching on this metal. They will urge the fire the same as for bronze, and forget all about it until they see a dazzling light under the furnace lid, when they will rush over, throw in more metal and repeat the performance until the pot is full. Then often they will leave it boiling there until the molders are ready for pouring, and when the pot is taken out of the fire, in spite of all the fluxes that can be used, the top of the pot will be found covered with a thick, white crust of zinc oxide, which will be pierced here and there with holes around which hills of oxide have been formed, giving the appearance of little volcanoes, which is further heightened by the flashes of flame which spurt out of them. With such methods the loss of metal is surprising. If the fire must be forced in order to get the metal out quickly, it will require constant watching and charging of new metal to keep the temperature low until the pot is filled, after which it can be quickly raised to the heat necessary for pouring. When remelting yellow brass, either scrap or gates, it is a good idea to add one pound of zinc to every twenty-five pounds of metal to allow for loss.

With regard to suitable fluxes for yellow brass, some foundries use the following: Salt cake, or crude carbonate soda, 5 parts; silica (white sand), 15 parts; coal dust (anthracite), 5 parts; bone ash, 20 parts. Mix and cover the surface of the metal, stirring it in before superheating.—[C. Vickers in American Machinist.

The Molder's Requirements.

To make castings of the intricate kind, requires something more than mere ability to shovel sand and sling a swab; judgment and foresight are more potent factors in the production of these castings than are muscular evolutions and ignorance. This some molders know, and many employers have ample evidence of the fact, in the increasing size of their scrap pile and a consequent diminution of profits. It seems paradoxical to say that when a boy or young man enters a foundry as an apprentice to learn the ancient art of molding and at the end of his four years' apprenticeship becomes (par excellence) a molder, that he is then in a position to demand his rights. His merits, well, they may be relegated to the bow-wows, they cut no figure whatever, he has learned the trade if four years' time serving means anything.

You might ask him the reason for scabs on a casting and receive a smile by way of answer, indicative of superlative indifference. Inquire if he has read any works on foundry practice, if he is acquainted with hundreds of things foundry apprentices should know; can he take charge of the cupola, what knowledge he has concerning the metallurgy of cast iron, his ability to determine the cubic inches contained in a 36"x1" square plate, or the amount of iron required to cast it, his knowledge of geometry as applicable to foundry practice, all simple questions any mechanic claiming merit in the foundry should at least be acquainted with, but it is only in rare instances that the prospective employer of high class molders will receive satisfactory replies.

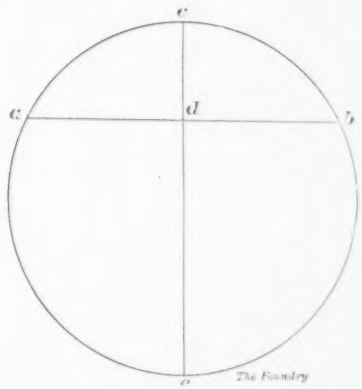
The moral in the foregoing is obvious. There is no short cut to knowledge; it is possible to secure a smattering of the trade in four years and in addition a swelled cranium with an exaggerated sense of importance which precedes a demand for two plunks and a half per diem, but to learn the trade of molding in that time is out of the question. Experience is a monitor not to be despised, as a teacher it is invaluable in the foundry and has been wrestling with methods and conditions of practice since the days when Pythagoras prepared to run his first heat. Yet inexperience and "The way it was done before," has first call among the rank and file of molders today. Still there are men working in foundries who are eager for the acquisition of higher principles in relation to their trade and by reason of conditions and environment are denied the opportunity. Notwithstanding these superficial difficulties the American molder has gained an enviable position among the nations of the world, and in these days of business activity and keen competition it is refreshing to find employers taking a lively interest in and seeking to better the standard of molders. The question of making "The man a better mechanic, the mechanic a better man" deserves the consideration of the best minds in the foundry business that the molder may be lifted up and claim the title, which rightfully belongs to him, (to borrow a phrase from Mr. Bolland) the Prince of Mechanics.

J. TEMPLE MACCARTNEY.

Jeanesville, Pa.

Finding the Diameter of a Pulley.

In THE FOUNDRY for May, 1901, I find an article entitled "To find the radius of a broken pulley" with an example illustrating the same. Might it not be well to give the general formula for this and its derivation which is as follows:



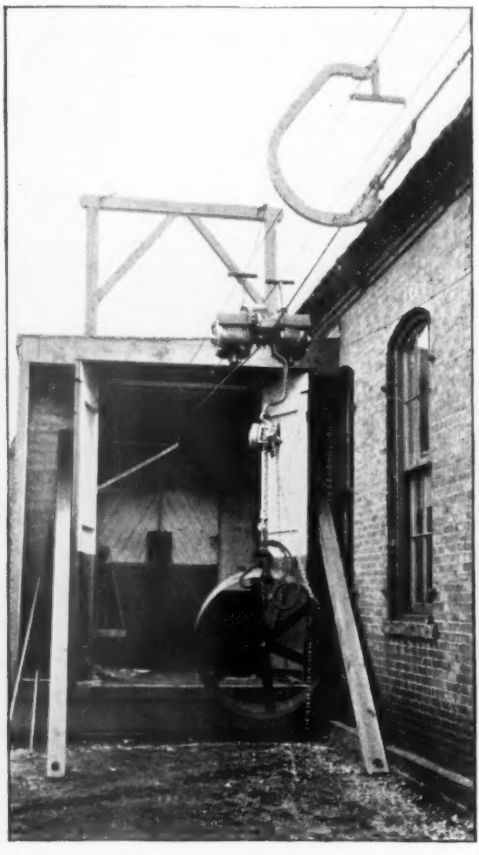
Referring to the figure which is similar to that given before we have the distances c to d and a to b known and desire to find the distance c to e, that is the diameter of the pulley. From geometry we know that $\overline{ab}^2 = cd \times de$ from which we get $de = \frac{\overline{db}^2}{cd}$. We readily see from the figure that $ce = de + cd$, and substituting for de its value $\frac{db^2}{cd}$ we have $ce = cd + \frac{\overline{db}^2}{cd}$, which is the desired formula. In other words the diameter of the pulley equals the square of one-half the chord divided by the perpendicular distance from the chord to the rim, plus the distance from the chord to the rim.

A. H. EMERY, JR.

The Telpherage System.

The word "Telpherage," meaning the automatic conveying of articles by electricity, was coined by Professor Fleming Jenkins. While the idea is not new, the application of the principle is of comparatively recent date. The United Telpherage Co. has done much to perfect the system, and now have a very simple motor having no gearing, the traction wheel being hung directly on the axle of the motors.

In operation all movements on the tel-



THE TELPHERAGE SYSTEM.

pherage system is regulated automatically from the starting point by one operator, no attendant being necessary to accompany the load which may be moved at any desired speed, started or stopped at any point.

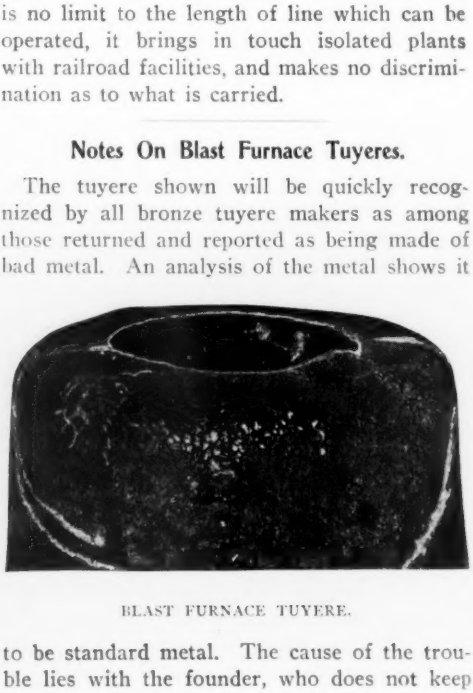
The relative amount of power necessary to operate the Telpher is so small that any plant having an electrical power will not miss the amount used for conveying materials by this system. The original cost of installation is low and the cost of maintenance infinitesimal.

The telpherage system may be utilized in the foundry for handling materials of all kinds, taking same into the shop and the finished product out. Our illustration shows part of a telpherage system, intended, among other things, to transfer castings from the foundry to the different departments of the machine shop.

The United Telpherage Co. of 20 Broad Street, New York, who are the manufacturers of the telpherage system, say that the same has been installed in several lines of industry and has given universal satisfaction. Special attention is paid by the company's engineers to local conditions and requirements. As there is no limit to the length of line which can be operated, it brings in touch isolated plants with railroad facilities, and makes no discrimination as to what is carried.

Notes On Blast Furnace Tuyeres.

The tuyere shown will be quickly recognized by all bronze tuyere makers as among those returned and reported as being made of bad metal. An analysis of the metal shows it



BLAST FURNACE TUYERE.

to be standard metal. The cause of the trouble lies with the founder, who does not keep his air passage open in the fuel in front of the tuyere to let the air penetrate into the crucible, or it may be in the use of too large a tuyere. When the cinder trickling down through the fuel in front of a tuyere becomes chilled by the entrance of the air at that point the blast is diverted upward and starts melting above the tuyeres, burning off the surface of the tuyere and oxidizing the metal, making it brittle. This molten material wears grooves on the surface of the nose, and when these grooves meet and join they cut a large groove in the nose, which cracks open. The water then enters the furnace, chills the hearth and lowers the grade of the iron.

An investigation of a case like this will reveal that the pricker rod for opening the space in front of the tuyere is lying in some corner, dusty and rusty. Soon as symptoms that the blast does not penetrate are discovered the pricker rod must be applied vigorously until the blast penetrates the crucible properly. This whole trouble comes from the abandonment of the pricker rod. A furnace having a pricker rod worn bright by use does not have this trouble, and a more uniform working with increased results is obtained. The air passing the nose of the tuyere is at a temperature of, say, 1,200 degrees, and is highly oxidizing. Copper melts at about 1,950 degrees, and the cast iron running over the nose of the tuyere is at a temperature of about 3,600 degrees. These conditions all favor the burning of the surface of the nose of the tuyere. When a rill of iron flows over the nose, the tuyere gets hot in spite of the water circulating in it, and as the surface of the metal approaches a red heat the air begins to burn or oxidize the copper. The metal of the nose does not melt, but burns, leaving it brittle, spongy and easy to crack. The temperature of the crucible and the cinder on No. 1 iron is about 3,600 degrees. At a temperature of about 50 degrees the cinder chills close to the nose of the tuyere, creating an obstruction to the entrance of the air, thus dispersing it sideways and upward and preventing penetration. Cold air requires almost constant use of the pricker rod. When pipe stoves are used, with the attendant air temperature of 900 degrees of air, the cinder does not chill so quickly. Still, the pricker rod must be used. With brick stoves and an air temperature of 1,200 degrees the cinder chills less quickly than with 900 degrees, but the pricker rod cannot be abandoned.

With the larger volume of air now used, an obstruction once formed in front of a tuyere soon becomes worse and the destruction of the tuyere from the molten material flowing down over it is quickly accomplished. The result is a loss to the furnace proprietor and the tuyere maker, who must come in for his share of blame. More watchfulness on the part of the keeper and the use of the pricker rod by the helper will give the superintendent more peace of mind and a larger profit from his furnace. Means should be provided at every tuyere to show that all the tuyeres are working evenly. When tuyeres with excessively large nozzles are used the air has no penetrating power and is reflected upward, and the molten material flowing down over the nose of the tuyere burns it in the manner already described. This is corrected by using a smaller nozzle, but the pricker rod must not be abandoned.

A clinker forming in front of a tuyere has a crushing strength of 311 pounds per square inch, while pressure of the entering air is 12 pounds. What chance has the air to penetrate the clinker and get rid of the melting of the rills of iron from the melting going on right over the tuyeres. The application of the pricker rod is the only thing to stop it. What is more effective and saves loss of the blast is a small cartridge put up against the clinker or driven into it and exploded. These can be had cheaply, and do their work, as they open a fissure through the clinker, allowing the blast to penetrate to the fuel back of the clinker and melt it away.

How many furnacemen know which tuyere is taking the most blast, robbing the other and causing scaffolds with explosions? The simple fact of losing a number of tuyeres in succession at one opening shows that the furnace is working lopsided. When they are lost all around the proof is furnished that there is not sufficient penetration, which is due to a chilled center or excessively large nozzles. The wider the crucible the more care is required to get penetration to the center and save the tuyeres. Has the art of running a furnace increased with the size of the furnace used today?

A velocity of entering air of 20,000 feet per minute is required for anthracite, for coke it is 15,000 feet, and for charcoal 10,000 feet per minute. This estimate has been justified by 25 years' practice, and no cause has been found to change it if good work is required. Tuyeres have run 33 months, to be then taken out because they were worn too thin for safety. Twelve months is a good run for a tuyere, but plenty are burned in half an hour. Zinc or lead in the ores alloys with the metal on the nose, melts and runs off. With the rapid driving of furnaces as at present the greatest care and watchfulness is imperative.

That the metal was burned off the top of the nose of the tuyere here described is shown by measurements of the nose at the burned part at the top and at the bottom.

At the part of the top burnt the thickness was 3-32 inch. The good metal at the top had a thickness of 3-16 inch, while the good metal at the bottom was 3/8 inch thick.—[John M. Hartman in Iron Age.

Trouble With Coke in the Cupola.

On my return from Arizona, I laid over for a few days in El Paso, Texas, visiting a friend of mine, the proprietor of a foundry and machine shop. While there a telegram came from a firm running a foundry in the southern part of the Territory, asking him to send a man there to find out what was the matter with their cupola, or the reason they could not get soft castings. My friend asked me to go, and as I had not been in that part of the country I thought I would take it in.

When I arrived there I found things as stated. The castings, both light and heavy, were white and brittle all through them, and they could not tell the reason, unless it was the daubing they used to fix the cupola with. I knew it could not be that, as I had used the same kind of silica sand in Jerome. I resolved to take off a heat. They had some very good-looking coke, so I did not think the trouble was there; but when the castings were turned out they were no better than the others that they had made. The second heat, also, was no better, so I started in to find out the trouble. I neglected to state that this was at a copper smelter, and that they used a variety of fuel—coke, soft coal, and hard coal. Being down at the smelter the next day I saw this hard coal, and it struck me to try it, as I had an idea that it was the sulphur in the coke that caused all the trouble. It should be stated here that there was not a pound of pig iron in the place, but some very good scrap that should turn out very good castings under ordinary circumstances, and with the coal everything came out all right. So, after we had found out what was the trouble, I asked the superintendent to get some Connellsville coke. When that came I took off a few heats with that, and everything was O. K. Telling this to a friend of mine, the other day, he told me that he had been in the fix himself once, and the way that he got over it was this: He put all hard coal on his bed in the cupola, and the castings were all right, and that he thought that the coal neutralized the sulphur in the coke.—[Thos. Wathey in American Machinist.

Advice From a Retired Metallurgist.

It has been voiced about in this vicinity that I read THE FOUNDRY, therefore I am considered a smart man, in consequence of which I receive many letters asking my advice. These I shall try to answer to the best of my ability.

Adam: A good core compound is 2 pails flour, ½ pail of rosin, 1 quart molasses, 45½ pennyweights white sand, and 12 lbs. Smooth On. The cores need no venting or rods and are guaranteed not to blow or scab in the core oven or on the shelf.

Sandusky Foundry Proprietor: The best way to judge a molder is to take him to a beer saloon and if he can stand 15 to 20 schooners and swallow half the lunch counter he is a union man worth $3 a day.

Sandy McTague: Sometimes the iron is melted and gets in front of the tuyeres and the blast mixes with the iron, the boy who is skimming forgets to stir the wind out and the next morning you have a casting full of blow holes. When the iron is too thick and wont run light castings add about 10 per cent hydrant water, mix thoroughly. The cupola should be lined with red clay bricks over which a coat of window glass putty about 2½ inches thick can be rubbed and also a good coat of tar so that the lining will be water proof.

Romeo: Next time you call on your girl tell her you are a sand artist, no mud puddler, and the plumber won't be in it. Loam molders may belong to the bricklayers' union and the helpers to the hod carriers' union.

McCan: Horse manure is put in molds to take the smell of gas away. A foundry situated near a bone factory has plenty castings blow on account of the bad gas. No, Mrs. Nation wouldn't make a good floor molder, she wouldn't want to have a bar in the cope.

O'Flynn: Of course all the large foundries buy glue by the 5c bottles to paste their cores together also bundle wood for the cupola. A good way to raise your foundry 2 feet is to put about 200 lbs. of yeast under the foundation. If you want to be an expert on pig iron you have to follow these directions: You walk into the foundry, present your card to the boss, break up a pig, examine it carefully for 5 minutes, then talk hog latin the next 10 minutes, charge $5 and in 5 more minutes have that foundry door behind your back.

O. Scheizfufez: White iron is caused by throwing too much flour on a mold. Malleable iron is iron which may be struck with a rubber mallet without breaking it.

J. A. Ridgwell and A. J. Hall, under the name of the Norfolk Foundry, Ridgwell & Hall, proprietors, have opened an iron and brass foundry at Norfolk, Va., equipped with modern facilities for the manufacture of castings.

Cast Iron Pockets or Drawbacks.

Cast iron pockets or drawbacks may be used to advantage in the molding of castings having flanges, brackets, bosses, etc., which necessitates deep lifts. Such castings are fairly numerous in general engine and tool works where standard patterns are used, and in these

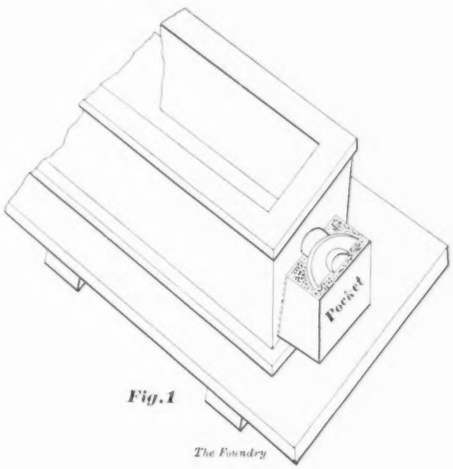


Fig. 1

the slight expense of making cast iron pockets does not have to be borne by a single casting.

Where pockets are used to avoid deep lifts wherever possible, a number and variety of sizes soon accumulate so that one may readily

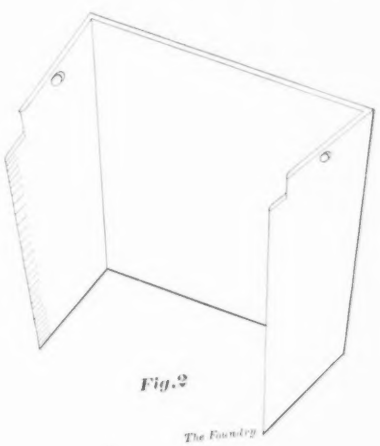


Fig. 2

be found to fit most any casting which has to be made. By the use of these cast iron pockets a great deal of joint-making is avoided, and in many cases the use of gaggers is rendered unnecessary.

Figure 1 shows a steam chest pattern set on bottom board and cast iron pocket being rammed up as shown in order that the flange may be drawn. The pocket is tapered on the sides and back, and made fairly smooth on its outside surfaces. The front edges, which bear against the pattern, are knife edged and are kept from actual contact with the pattern by a

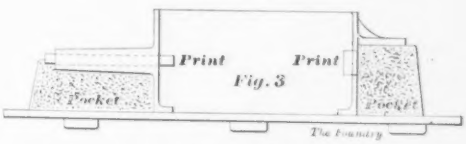


Fig. 3

couple of sprigs inserted between the edges of the pockets and the pattern. As shown in figure 1, the pattern is ready to have the drag placed on the bottom board and be rammed up. After the cope has been rammed up and lifted off the pattern is rapped, and the pocket lifted off. Clean lifts are the rule, for as soon as the pocket is started it is clear of the front of

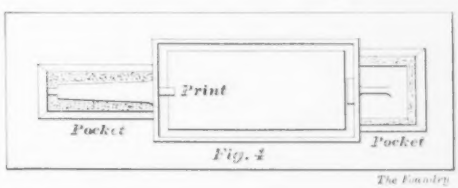


Fig. 4

the pattern, the smooth back of the pattern giving a steady sliding surface for a guide.

Figure 2 gives a general view of the pocket used for this job.

Figures 3 and 4 are side and plan views of a gear box. The pattern is shown on the bottom board with pockets rammed up.

Figure 5 shows an engine bed bedded in the

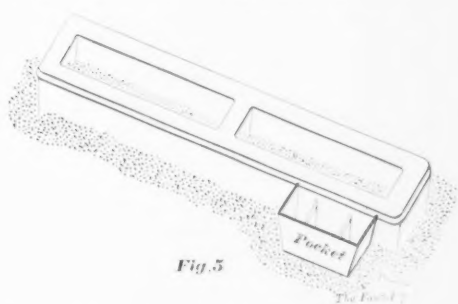


Fig. 5

floor with pocket to lift away bracket. In this instance the mold and pocket are rammed up at the same time, a joint being made around the edge of the bracket before the pocket is placed in position. No further attention is given to the pocket, both the outside and inside being

rammed up together until the cope joint is reached.

Where these pockets or drawbacks have to be very large bars may be jammed across on which to hang gaggers, but for small and medium sized work the taper in the box is sufficient to hold the sand it contains.

GEORGE BUCHANAN.

Wrexham, North Wales.

A Few Lessons.

There are certain invariable laws connected with a foundryman's vocation which it occurs to me it would be well for him to know and practice them early and often, if his career as a journeyman is to be a good one.

It is unaccountable how few grasp these seemingly self-evident truths. The general ignorance of these matters which might properly be called the A. B. C. of the art of molding is both humiliating to the operative and expensive to the employer.

Take for example the general ignorance among molders concerning the law of hydraulics or pressure of liquids. While the average molder knows that stand pipes are erected in connection with water works in order to give pressure to water, it is evidently difficult for him to understand that the same principle which governs this application can also be applied to liquid iron. He should know this in order that he may properly secure his cores or mold. The same law which governs the pressure of water governs the pressure of all liquids, whether metals or not.

The pressure also occurs in the same ratio as the specific gravity of the liquid. Iron is 7.2 times heavier than water, and as the latter at a height of twelve inches has a pressure of .434 lbs., the iron must have a pressure of 7.2 x .434 lbs., or 3 9-32 lbs. per square inch. In order that we may be absolutely safe and also that we may more readily use this factor, we may say that a column of liquid iron twelve inches high has a pressure of four lbs. to the square inch, at 6 inches of 21 lbs., and at 3 inches 1 lb. Weighting the mold down according to this rule and we have an additional margin of safety in the weight of the cope and any cores it may contain.

Not long since, an apprentice molded a few pieces such as are shown in figure one, flat backs as they are sometimes called. To secure the cope against lifting, four clamps were used. Shortly after this he was given a pattern something like figure 2. The lifting area on the cope of figure 1 was about 64 sq. in. and with a 3 inch head, there was exerted a lifting force of 64 lbs. The area of lifting surface on figure 2 was about 212 sq. in. With a 3 inch head this would give 212 lbs. Add to this the area of the bottom of the pan at a depth of six inches and we have an additional lifting force of 280 lbs., making a total of 492 lbs. for figure 2. When the boy had clamped up the latter mold with only three clamps, the foreman asked him how he expected to hold same with only three clamps when he had four on the first one, to which the boy replied that since the casting was a great deal lighter it could not exert the pressure of the heavier one, at least, he remarked, that is what the molders have been telling me.

I mention this just to show the general ignorance which exists on this subject among molders.

Not long since a veteran molder said he

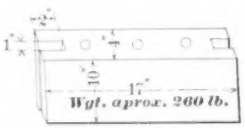


Fig.1.

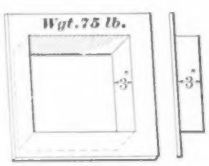


Fig.2.

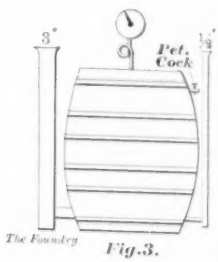


Fig.3.

would use a smaller pouring gate upon the next casting which required quite a deep mold and then there would be less pressure, etc. The foreman then asked him if a barrel fitted up with an indicator gauge in the head and pipes for inlets arranged upon each side, one three inch, the other half an inch in diameter as shown in figure 3, if filling the barrel with either one of the pipes would register any difference on the dial of the gauge.

Of course the rapid filling of a mold and bringing it up full with a jump will cause a momentary extra force depending upon the height the metal falls into the pouring gate, but this momentum has to be resisted but temporarily and as a rule can be guarded against by judicious watching. It should be remembered, however, that the pressure on the mold is continuous until lessened by coagulation and ceases only when the metal is solid.

L. C. JEWETT.

The Use of Phosphorus.

Answering a question in the *American Machinist*, C. Vickers writes as follows on this subject:

"Regarding the use and handling of phosphorus, allow me to state that there are several ways of adding it to alloys, viz.: by the use of phosphide of tin or phosphide of copper, and by using stick phosphorus. The tin phosphide (or phosphor tin, as it is called) is the best and safest, and for making phosphor bronze gives superior results. Experiments which the writer has conducted have shown that common casting copper, made into bronze by the use of 5 per cent phosphor tin, possesses a tensile strength greater by 10,000 pounds per square inch over Lake copper made into bronze by the use of block tin and stick phosphorus.

"Stick phosphorus should be kept in water in an earthenware vessel (as metal vessels are liable to leakage, allowing the water to drain off and the phosphorus to ignite). It should be taken out of the can in which it is purchased, and the sticks broken by lightly tapping with a small hammer holding them in the hand meanwhile. A few crystals of blue vitriol should be placed in the water, and when the phosphorus is coated with copper, it should be placed in clean water and the water kept clean by changing at intervals. Phosphorus thus copper-coated has been kept out of water several days, and even carried around in the vest pocket. Such a proceeding, however, is not recommended by the writer. Never allow familiarity to breed contempt when handling dangerous articles or substances; and however thoroughly protected the phosphorus may be, handle it quickly when out of water. Naked phosphorus, when taken out of water and placed on a board, ignites in about seven minutes at an ordinary temperature, say 82 degrees.

"When adding it to alloys, take the metal from the fire, put the required amount of phosphorus in a vessel containing water, and throw it piece by piece on top of the metal, stirring gently, changing the stirrer when heated. Do not attempt to dry the phosphorus, nor invent schemes for plunging it beneath the metal. The writer has tried them all, and they are fruitful causes of accidents. Neither friction nor heat can be used to dry the phosphorus, and time is short, as the metal won't wait. The water on the phosphorus does no harm when the latter is thrown on top of the metal. If you imagine you are losing all your phosphorus by this procedure, take two pieces of equal size, ignite one on the floor, throw the other on the metal, and you will find that the latter piece is absorbed in a short time, while the fumes from the burning piece on the floor will drive everyone out of the shop. In regard to these fumes, do not breathe them, but get the smoke out of the shop as quickly as possible, as it is highly poisonous."

Pressure of Fluid Metals.

In the November issue of THE FOUNDRY on page 137 there is a question asked on the above subject. In it we have a matter of everyday importance to the practical molder.

Although somewhat dense and interpreted by many as a conundrum, yet to others it has been the cause of much thought relative to the force of fluid metal in the general routine of casting foundry work.

If the question referred to above had been asked more definitely, it could have been dealt with with greater preciseness. As it appears we have four distinct forces in the form of pressure working in opposite directions, but still coming from the same source. The designs used for illustrating the question would of course not be practical in every day work, but let us for convenience and as briefly as possible summarize these pressures, then the lifting pressure has the greatest individuality as it entirely depends upon the weight necessary to secure any given cope against straining.

Let us look at the rim of the 48-inch fly wheel one inch thick being extended to six inches, the question then is, How much more lifting pressure does this add to the cope? It is generally conceded that a column of fluid metal 3¾ inches high by an inch square gives one pound of hydrostatic pressure. In practice I prefer to regard it as four inches, which may be considered as a molder's factor of safety.

In adding five inches to the original rim we then have a surface six inches broad, and with this increase we have approximately 800 square inches. Assuming the joint of the rim or parting line to be 12 inches distant from the pouring basin, we then have 2,400 pounds as the increased pressure on the cope. With a rim 18 inches in thickness we have an increased pressure of nearly 10,000 pounds. The normal pressure has not been taken into account, as it is simply a question of increased pressure through increased surface and consequent weight.

In the January number Mr. E. B. Gilmour declares that height is the only thing that changes pressure, and in the February issue another contributor maintains the same doctrine by stating that a strain on the bottom and also a pressure on the mold sideways is the same. Had these statements been qualified with the phrase "proportional to each square inch" I would agree with them, but not otherwise. If this be correct, then it must follow that there is no more pressure on the sides of a one hundred inch diameter piston ring with say two inches of metal than there would be with a solid roller of the same diameter.

The former would according to the usual loam molders' practice be perfectly safe from bursting sideways by being held with two or three bands of hoop iron, used in the same way as a cooper would bind or hold a cask together. These two illustrations are to be regarded as open sand molds having a depth of 12 inches.

Now let us look at the contrast between these two molds. In the roller there is an approximate weight of 15 tons against one ton in the piston ring. In round numbers there is something like 650 square inches of area in the piston ring as against 7,854 square inches of area in the roller. Taking these figures, there is in the roller a pressure on the bottom and sides, counting the mean pressure as being two pounds, of about 15,908 pounds, while in the piston ring having the same diameter the pressure is only 1,300 pounds.

Assuming the foregoing figures to be only approximately correct, there is evidence enough to show that pressure is proportionately to the magnitude of surface, and that it will be impossible to increase surface without increasing pressure in every way.

Moreover no one with any experience would attempt to cast the solid mold without casing it or pitting it, while such a thing would not be necessary in casting the piston ring if it were held together in the same manner previously referred to.

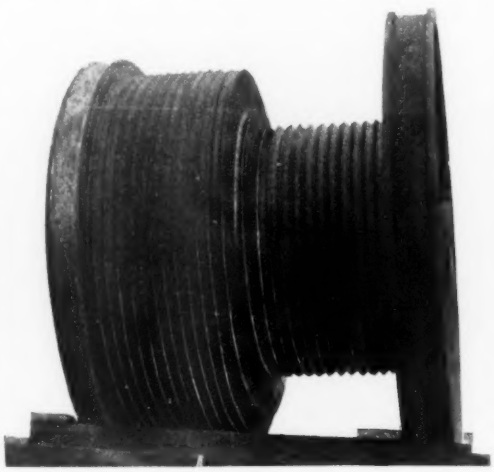
The phenomena of the fluid pressure of metals is no abstruse mathematical problem for the few, but is within the reach of the ordinary intelligent molder, and it is he who should give it the utmost attention.

WILLIAM ROXBURGH,
Kilmarnock, Scotland.

The Andrew Terry Co., manufacturers of malleable iron castings, at Terryville, Conn., will build an addition, 130 x 60 feet.

Made in Michigan.

We show herewith an illustration of a novel casting recently turned out by the Jackson & Church Co. of Saginaw, Mich. The illustration shows the casting as it came from the foundry without any work being put upon it. It is a spool for a dredge, and has a thread 1¾ inches pitch and 40 inches diameter to the center of the spool where it increases in size to 60 inches in diameter in two turns. This



A NOVEL CASTING.

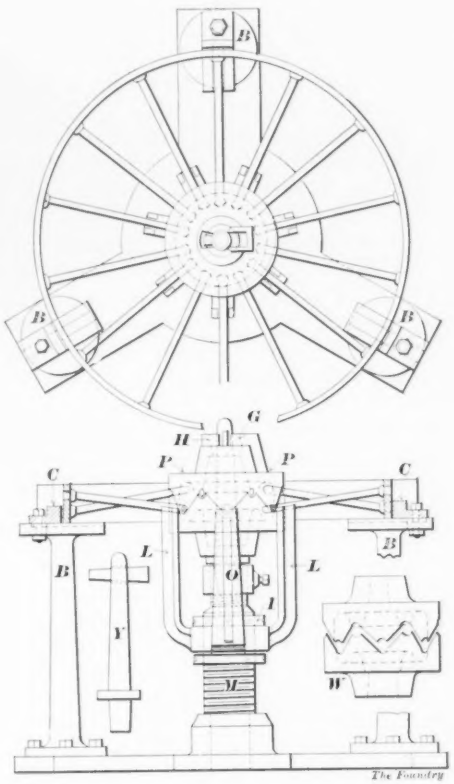
is a continuous thread from the time it commences at one end until it strikes the other, and is used just as it comes from the foundry, the flanges on the end being machined for the brake bands. The weight of this casting is between seven and eight tons, and the practical man will recognize in it a very difficult casting.

Thomas J. Alcott, proprietor of the firm of T. C. Alcott & Sons, hydraulic and mechanical engineers, founders, machinists and manufacturers of the High Duty turbine, at Mount Holly, N. J., has purchased the foundry, machine shop, etc., of the J. W. Taylor Mfg. Company in that city, better known as the plant of T. H. Risdon & Co., manufacturers of water wheels and general machinery. The present intention of the new owner is to operate both plants extensively in the manufacture of turbines, etc.

The Weatherly Foundry & Machine Co. have recently enlarged their plant at Weatherly, Pa., by a 75-foot addition.

Casting Hubs on Steel Wheels.

The following method was adopted in making steel wheels, for casting the hub on the spokes, true and central with the rim, without using sand molds and flasks, and without skilled labor. The iron mold is shown separately at W, the top and bottom halves being parted to show more plainly how it is constructed. Y represents the steel center core. The form of this mold is such that, when closed, the inner surfaces must come perfectly even with each other, there being no possibility of the parts shifting, each spoke helping to keep the parts in place. The inner surfaces, shown by the dotted lines, are turned true and smooth, but not polished. The taper hole in each half is bored to fit the taper core, so that when the two halves are placed on the core and the taper key is driven we have a complete mold.



RIG FOR CASTING HUBS ON STEEL WHEELS.

The assembling table or stand has a central column M, which is threaded and has two ring-nuts. The top end is cored, and has a ring with a taper hole to carry the taper end of the core. The seven-armed spider L is bored a sliding fit on the column. It can be raised or lowered by the ring-nuts I J. The three columns B having slotted flanges on the upper ends are supplied with dogs, C, C, which can be set at proper distances from the center column to receive wheel rims of different diameters.

To assemble the molds, spokes and rims ready for pouring, the core is placed in the taper hole O in the top of the column M. The lower half of the mold is next placed on the core, the seven-armed spider and the core having first been set in proper relative position. The rim and spokes are then placed on the columns with seven of the spokes resting in the slots in the tops of the arms. The top half of the mold is next dropped on, and the key driven. The mold is now ready to receive the melted iron. Before putting the mold in place, it is thoroughly coated with dry graphite, rubbed well into the surface of the iron.

As many molds as desired could be made. If ten wheels per day are wanted, ten molds should be made. The reason for this is that to handle the job quickly and to avoid contact with the hot molds it is necessary to have the entire number wanted per day assembled before the operation of filling the molds commences. As each wheel is assembled it is removed from the stand and set aside, and it is replaced on the stand when being filled with the melted metal. G is the pouring gate, and H the riser; P, vent holes, which are 1-16 inch at the inner end and ¼ inch at the outer end. These allow the air or gases to escape from the part of the mold above the holes in which the spokes enter. After the mold is filled and allowed to chill sufficiently to prevent bleeding, the key is removed and the center core is knocked out. This should be done as soon as possible, to avoid trouble by the metal shrinking on the core. The mold will readily drop away from the casting, the shrinkage being away from the surfaces.

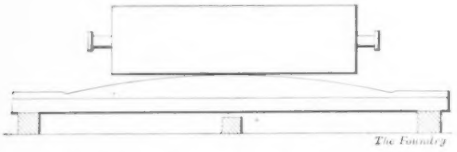
When the center core is removed, a light blow inward with a hammer will knock off the gate and riser. It is then an easy matter to lift off the top half of the mold and to assist the cooling by using a shower of water, bringing the heat down to where there is no danger of springing out of shape when the wheel is lifted from the lower half of the mold. It is possible to cast several hubs per hour using only one mold, by cooling after

each cast. Assembling each wheel as wanted, the successful handling of this outfit depends very much on the condition of the iron when poured. It must not be too hot; yet must be sufficiently so to run in the mold without forming wrinkles or cold shuts.

The advantages of this system of wheel-making are: the employment of unskilled labor in the work from start to finish, small space required in the foundry and the small cost of the wheels.—[B. W. T., in American Machinist.

Straightening Crooked Castings.

I do not think there is anything more annoying to a good molder than to find, after taking the greatest pains possible, that his work, although excellent in every other respect, has come out crooked. Two years ago



STRAIGHTENING CROOKED CASTINGS

I had an experience in this respect which may be of interest to some readers of this journal, and perhaps it may help in time of need.

The accompanying sketch represents an ordinary cross rail for a planing machine, for which we had an order to make a dozen. After making six and delivering them to the toolmakers for whom we were casting them, they sent word that they were all useless, being ¼ in. crooked. I asked to see them, and was taken into the shop. I put a straightedge on them, and they were just as bad as stated, being ¼ in. crooked. However, they agreed to accept them if I straightened them without reducing the quality of the casting. I took one inside the shop, where the wind could not interfere, and placed it upon two iron blocks, as shown, with another iron block in the center, but ¼ in. below the level of the others. I then placed a 3-ton weight upon the center, and having everything now ready, I started a fierce fire of wood right across and underneath the center of the casting. This was kept going as hot as possible until the casting was quite red hot. When this was accomplished I drew the fire from underneath and allowed that part to cool off, while I kept the fire still burning on the top side until the bottom was quite cool, or cool enough to have ceased to contract, when the balance of the fire was removed, and the casting allowed to remain until perfectly cold. Upon taking it out into the fitting-shop it was found to be perfectly straight.

To those who do not meet with this kind of casting, the query may suggest itself, What made the castings crooked? But to the experienced no explanation is needed. In this case the slide bar had a strip along each side about 3 in. square; but in the semi-circle, or crowning part, which is cored out to save metal, there was only about ⅝ in. of metal, which of course explains the cause of the crookedness, since the ⅝ in. of metal is bound to get quite cool while the 3 in. of metal still retains a good heat and has not begun to contract. Some molders say that when you get a casting of this kind you should mold it crooked, so that it will be straight when it comes out of the sand. To this I would say, it is only a guess-work rule, and you generally have to make one or two, or maybe more, castings to find out just how much you must bend your pattern to have it come out straight. The best method I have arrived at from some years' personal experience is to carefully study the work, and discover the parts which are most likely to retain the heat the longest, and then by exposing these parts in the most convenient way, almost any casting that is made can be molded straight, and kept so. I have had some experience along these lines with lathe beds, and found this rule indispensable with such work. But just here I would like to say that I do not think theoretical designers are familiar enough with these difficulties, or they would be a little more considerate in the matter, both for the welfare of the molder and for the machinery they are preparing. It is undoubtedly a very serious drawback to any casting to have a very great contrast in the thickness of metals cast in one piece. I am also convinced that there is not enough attention paid to apprentices in this direction, and they are consequently allowed to go along until they are quite well on in years, and they then have to learn these points by the loss of work or some unpleasant and unprofitable experience.—[J. H., in Mechanical World.

Charles Groenke, late owner of the Merrill (Wis.) Iron Works, has established a foundry at Everett, Wash.

Harry Hicks is building a foundry addition to his machine shop at North Vernon, Ind.

Cupola Coke.

BY EDWARD KIRK.

From a paper entitled "A History of Connellsville Coke," prepared by Mr. F. C. Kieghley, and read before the Central Mining Institute of Western Pennsylvania, it appears that coke was first made in this country in 1817 at Plumsack, Fayette County, Pa., for rolling mill use.

In 1837 F. H. Oliphant made coke at his Fairchance Furnace, near Uniontown, Pa. All the early coke was made on the ground, in what was known as coke rickets.

The first coke made in ovens was in about 1841. In that year, Province McCormick and James Campbell, two carpenters, and John Taylor, a stone mason, commenced making coke with two ovens and in the spring of 1842 had enough coke stacked to fill two boats, or about 800 bushels, which they took down the river on a high stage of water to Cincinnati, Ohio.

This appears to have been the first shipment of coke as an article of commerce of which there is any record. A part of this cargo was afterwards boated by canal to Dayton, Ohio, and was there sold to Judge Gebhard, a former resident of Pennsylvania, who then had a foundry in operation at Dayton. He used the coke in his establishment and found it so well adapted for his purpose that he afterwards came to Connellsville and proposed to Campbell and McCormick to make more.

This appears to be the first record of Connellsville coke having been used in a foundry, for in a long research I have been unable to find any record of it having been used prior to this date; but it is likely that coke was used in foundries prior to this date. For in the early days it was the custom of foundrymen to make their own coke, and this practice was still in vogue in the sixties; and as late as 1863 the coke ovens of the A. Bradley Stove Works of Pittsburg, Pa., were still standing in the foundry yards, although they were not in use at that time. At a still later date we have seen foundrymen making their own coke at a distance from Pittsburg, and it was not until late in the sixties that it became the general practice of foundrymen to buy their coke, even in the vicinity of Pittsburg.

It was the practice for two or more foundries in these days to build a coke oven together, and either make their coke together or take turns using the ovens. I remember when a boy going to school, one of these ovens built at Sharon, Pa., by William McGilvery & Co., and Joseph King & Co. It was located in Pine Hollow, near the Jennie Berg hill, alongside of a tram road, constructed to carry coal from the mines for shipment by the canal, and was only in operation occasionally, when a supply of coke was required by either foundry.

When in operation in the winter the boys always went to this hill to coast and get warmed at the coke oven, and many times have I warmed my shins at the old coke oven, when a boy. Later on, when a moulder in the employ of Joseph King & Co., I learned the history of the oven, which was removed in 1867, after having been abandoned for a number of years, when the supply of coke was received from Pittsburg and known as Pittsburg coke, made from Pittsburg coal. At that time there were numerous coke ovens along the Monongahela River and Allegheny Valley Railroad, employed in manufacturing foundry coke, which was known as Pittsburg coke. Later on, Connellsville coke came upon the market, and about 1870 or '71 completely replaced the Pittsburg coke as a foundry fuel.

In these various cokes may be traced the advancement made in the manufacture of coke. That made at Sharon was a soft, dark coke, weighing about 32 pounds to the bushel. Pittsburg coke was a denser coke of a dark color, weighing 46 pounds to the bushel. Connellsville coke was of a light color and when put upon the market in its early days weighed 46 pounds to the bushel. The manufacture of this coke has been improved until we now have it of a silvery white, weighing as high as 72 pounds to the bushel.

Another coke that had a high reputation in early days was Blossburg coke, made at Blossburg, Pa. The supply of this coke was limited and it never came into general use, and I do not remember ever having used it in melting. Numerous other foundry cokes have been put upon the market at various times, but they have so far as I have been able to learn, proven failures to a greater or lesser extent. Among these were Hocking Valley coke and others made from Ohio coal.

The cause of failure was due to the large per cent of sulphur in the coal, which was not removed in the process of coking and could not be removed by various plans tried for washing the coal and preparing it before coking, or by devices in the construction of ovens for its removal.

When engaged in the foundry business in Ohio in 1871 a coke oven was constructed at

Urichsville, Ohio, and I was given a half car load of this coke to try it. The coke had the appearance of being a good foundry coke, but when tried in the cupola hardened the iron to such an extent that the casting was worthless, and after a number of attempts to use it by changing the mixture of iron it was condemned. Other founders who were induced to try it had about the same experience with it, and when passing the oven a few years later I found it abandoned and a complete wreck.

No coal has yet been found in this country equal to the coal of the Connellsville coal region for the manufacture of coke. This region has become the great manufacturing coke center of this country and the output has increased from that of a few ovens to thousands, amounting to millions of tons of coke annually, and probably ninety per cent. of all the foundry coke used in this country at the present time is Connellsville coke. It carries a heavier burden in a cupola and melts iron more rapidly than any other coke. It is said to be freer from impurities detrimental to iron than other cokes, and is the most economical fuel for the cupola, although the cost of transportation may render it expensive.

When this is the case the question of economy when melting must be considered by the founder, and I shall endeavor to give a few points on this subject.

That a coke should be a good cupola coke, it is not necessary that it should be equal to Connellsville coke in every respect. A coke that is worthless in a blast furnace producing 700 tons of iron a day and kept in blast for many months, or as long as the furnace lining will last, may be a good coke in the cupola melting a few tons of iron and only in blast for from one to two or three hours.

A soft coke, free from impurities detrimental to iron, may be a more economical coke than a hard one, even if double the quantity is required to do the melting and more time is consumed in melting.

Gas house coke may be used for melting small heats and coke made in the vicinity for other purposes may be used for melting if the cupola is managed to suit the coke, or founders may find it more economical to construct ovens and make their own coke from coal in the immediate vicinity, as did foundrymen years ago, than to pay for transporting the better grades of coke long distances. Almost any coke will produce hot iron in a cupola if properly managed.

Two things are necessary in the manufacture of a good foundry coke. First, a good coking coal free from sulphur and other impurities detrimental to iron. Second, a properly constructed oven and a knowledge of the process of coking.

Foundries located at a long distance from the coke centers, who contemplate making their own coke with a view of reducing cost in melting, should bear these facts in mind, and have the available coal analyzed or thoroughly tested by coking in a small way, before going to the expense of constructing an oven or ovens of sufficient capacity to supply their wants.

In the early days of melting with coke it was the custom in filling a cupola, after putting in the bed, to mix the iron and fuel by putting in a shovel or two of coke and a few pieces of pig or a few shovels of scrap, and so on until the entire amount of iron to be melted was placed in the cupola.

Cupolas were filled in this way upon the theory or supposition that iron was melted in a cupola all the way up to the charging door, and two or three sets of tuyeres were placed in cupolas, one above the other, that the tuyere pipes might be raised to a higher set of tuyeres and the lower ones closed, when it was desired to collect molten iron for a large casting.

This practice was still in vogue in some sections in the early seventies, but had been abandoned long before that time in other sections; and the practice of placing fuel and iron in charges as at the present time adopted, upon the theory that iron is only melted in a cupola in a given space, which has been designated the melting zone.

With the system of mixing the iron and fuel the per cent of fuel consumed was much larger than with the present system, and the melting slower. When visiting foundries where this system was in use, I have frequently reduced the fuel consumed one-half and the time required for melting an equal amount, by changing the manner of filling the cupola to the charge system.

In early days, coke was all measured, bought and sold by the bushel, instead of by weight, and after the adoption of the charge system bushel baskets were used for measuring the coke and placing it in the cupola. And a founder when speaking of the ratio of fuel to iron melted, would state the amount melted per bushel of coke, in place of to the pounds of coke.

The bed and charges of coke were placed in the cupola by measure in place of by weight.

To learn the number of bushels of coke required for a bed for a cupola of any given diameter, the number of cubic inches in the space to be filled was ascertained, and the number divided by the number of cubic inches in a bushel.

For example, we will take a 30-inch cupola, with tuyeres 6 inches in diameter, located 12 inches above the sand bottom. This would make 18 inches from bottom to top of tuyeres. Add to this 18 inches for bed above top of tuyeres and we have a space or depth to be filled of 36 inches. The area of 30 inches diameter is 707; multiply this by 36 and we find the area to be filled to be 25,452 cu. in. Divide this number of cubic inches by the number of cubic inches in the average bushel, 2,200, and we find 11½ bushels of coke would be required for a bed for this cupola.

The charges of coke were generally made 5 inches in thickness and the amount of coke required learned by multiplying 707 by 5 and dividing the product by 2,200, which gives the amount of coke required for each charge, 1.6 bushels.

To these bushels were added, from time to time, a sufficient amount to make up for the burning away of the lining and enlarged diameter of the cupola.

The melting qualities of a coke were judged by its weight per bushel. A soft porous coke weighed 32 pounds and the harder and better the coke the heavier it weighed up to 46 pounds per bushel, which was regarded as the maximum weight of the best coke. The weight of a charge of iron on the bed varied with the quality of coke, and was from an equal weight of the bed to three times its weight. And the amount of iron placed in each charge varied from two to ten times the weight of the coke placed in the charge to melt it.

The number of pounds of iron melted to pounds of fuel varied with quality of coke and size of heat, and was from 3 to 8 to 1. This was the common practice of judging the quality of coke and melting in all the leading foundries in the early sixties. And in many of them there was more system in melting than in one-half the foundries at the present time.

In the early days of coke, its quality varied to a considerable extent. This was due to the differences in the coal from which the coke was made and again to badly designed and poorly constructed ovens and to lack of knowledge of the process of coking.

These difficulties have been overcome by the discovery of veins of coal more suitable for coking. The construction of ovens better adapted for the purpose, and a more perfect knowledge of the process of coking. Coke at the present time is of a more uniform grade than years ago, but there is still a considerable difference in the characteristics of the various cokes.

This variation is due in some instances to the quality of coal, but more frequently, especially in coke of the Connellsville region, to the time consumed in coking. This region has produced from time to time 24, 36, 48 and 72-hour coke. These cokes differ in density or hardness, according to the time consumed in coking, and vary in weight from 40 pounds to 72 pounds per bushel, which latter is said to be the weight of the Davis by-product coke.

The greater the length of time coke remains (up to a certain period) in an oven in the process of coking, the denser and harder it becomes. And the harder a coke, the longer the time required to consume it in a cupola, the heavier the burden it will carry and the larger the amount of iron it will melt.

It therefore follows, that a 72-hour coke is the best cupola coke; next to this is the 48-hour coke, and so on down to the 24-hour coke.

Seventy-two-hour coke for many years, and if we are not mistaken, at the present time, is only made once a week in the Connellsville region. The coke men of this region follow the example of the Lord, as set forth in the Bible, "And on the Seventh Day rest from all their labors," and no ovens are drawn on Sunday. The coke in ovens falling due to be drawn on Sunday as 48-hour coke, is permitted to remain in the ovens until Monday, when it becomes 72-hour coke, and this is the only 72-hour coke made. It is generally kept for filling foundry orders, but the supply is limited and when exhausted orders are sometimes filled with 48-hour coke, instead of 72-hour.

This is one of the reasons for the variation in the quality of foundry cokes and the cause of bad working of cupolas and poor melting, for the different grades of coke require a variation in the charging of a cupola, when coke is charged by weight in place of by measure.

The cupola furnace is a space furnace in which iron is melted in direct contact with the fuel and is supported by the fuel previous to melting.

To melt iron in this furnace, a sufficient space must be filled with fuel to admit of the iron to be melted entering the melting zone when

the cupola is in blast as rapidly as it can be melted.

If the amount of fuel is insufficient to fill the cupola to a proper height, the iron placed upon it settles below the melting zone and cannot be melted; and if the fuel is in excess and fills the cupola above a proper height, iron placed upon it cannot be melted until the excess of fuel is burned away, and permits the iron to settle into the melting zone.

It is therefore a matter of space occupied or filled by fuel, rather than of weight of fuel. With the old rule of placing coke in a cupola by the bushel, all cokes filled the same space, no matter to what extent their weights might differ per bushel. But the same weight of the different cokes do not fill the same space.

To illustrate this we will take the cupola above referred to, for which 11.56 bushels of coke is required for a bed. This number of bushels of coke of the various weights per bushel gives the following total weights:

Coke	32	lbs.	per	bushel	369.92
"	46	"	"	"	531.76
"	60	"	"	"	693.60
"	70	"	"	"	809.20

The total weights of any of these cokes would make a bed for this cupola, but the same weight of no two of them would make a proper bed.

For instance, were we to put in the weight of 11.56 bushels of 32-pound coke, 369.92, of 70-pound coke, this amount would not fill the cupola to the top of tuyeres, and not a pound of iron could be melted with such a bed.

On the other hand were we to put in the weight of 11.56 bushels of 70-pound coke, 809.20, of 32-pound coke, the cupola would be filled to such a height above the tuyeres that not a pound of iron could be melted, until 439.28 lbs. of coke was burned away and permitted the iron to settle into the melting zone.

The same rule applies to the charges equally as well as to the bed, and when the space between the charges of iron occupied by fuel is too small, the bed is not properly replenished, and the result is dull iron after one or more charges have been melted.

When the space filled with fuel is in excess, irregular and slow melting results, due to the melting being stopped, while the excess of fuel is being burned away to admit of the next charge of iron settling into the melting zone.

Melters, who do not understand the space theory of a cupola, will invariably increase the weight of coke, in bed and charges, when they have a soft light coke to melt with, and decrease it when they have a hard, heavy coke. This is a mistake! And exactly the reverse should be done. For the lighter a coke, the more space it occupies, and the heavier a coke, the less space it occupies, as illustrated in the bed of 32-pound and 70-pound coke. And by increasing the weight of coke, or even putting in the same weight with a light coke as a heavy one, too great a space is filled with fuel and iron is placed too high in a cupola for either fast or economical melting.

This theory of melting should be followed by every founder melting with coke, and as the quality of the different cars of coke frequently vary to a considerable extent, some means should be devised or provided in every foundry for determining the weight of coke per cubic foot or bushel, when such information is not furnished with the coke, and charging should be made to suit the quality of the coke.

Hot iron may be melted in a cupola with any grade of coke; if this theory of melting is practiced; and equally hot fluid iron can be melted with a 32-pound as with a 70-pound coke.

But it must be remembered that a light coke is inferior to a heavy coke as a cupola fuel. It will not carry as heavy a burden or melt iron as rapidly, and a cupola cannot be kept in blast in good condition for melting for so great a length of time. And with a very light coke, it is sometimes necessary to make the size of a heat to suit the coke, for even by tapping slag, a cupola could not be kept in blast for any great length of time with light gas works coke; while a cupola may be kept in blast as long as the lining will last with a good quality of coke, and good melting done throughout the heat.

The remedy in melting when coke is poor is not to increase the coke, but to decrease the weight of iron or bed and charges, and they should be varied to suit the coke. When a coke is light, and the weight placed in the bed and charges is reduced, the weight of iron placed upon them should be correspondingly reduced; and when coke is heavy, the weight in bed and charges should be increased and the weight of iron also increased.

Coke and iron should be evenly charged throughout a heat, that is, the proportion of fuel to iron should be the same.

The old rule of charging is to place three pounds of iron to one of coke in the bed, upon

the bed, and ten to one upon the charges.

This rule is a good one, as it gives the proportion of fuel to iron throughout a heat, and with 46-pound coke and tuyeres of a certain height, gives about the proper proportion of fuel to iron for fast and economical melting. But the rule is not applicable in all cases. In the first place, the rule does not apply to cupolas with tuyeres of different heights, for fuel under the tuyeres takes no part in melting, and when tuyeres are very high, the amount of coke required for a bed is so large that three to one cannot be melted upon it without lowering the top of the bed to such an extent that it is not restored to a proper height for melting, by the next charge of fuel. The result is uneven melting and dull iron throughout the remainder of the heat.

With low tuyeres, the weight of coke required for a bed is not so great and four or five to one may be melted upon it with the same grade of coke, without detriment to further melting.

Again, the rule does not apply accurately to coke of different grades. For we have found in a number of cases, when melting with gas works coke, that from one to two to one was the best that could be done on the bed, and from five to six to one the best that could be done on the charges; and in the same cupola we have melted four to one on the bed and ten to one on the charges with a good coke.

In regulating melting in different foundries, we have found our best guide for bed and charges to be measurement and weight as follows:

When melting in a cupola we had never seen melt, and for which previous melting was no guide for melting, we first obtained the measurement from sand bottom to top of tuyeres, then measurement from bottom of charging door down to a proper height for top of bed, and procured a pole or rod for determining this measurement when the bed was in. We then determined the quality of coke by weighing a bushel, or inspection. The blast machinery and pipes were then inspected and a bed put in to suit the coke and blast. With a light coke the bed was made a little higher than with a heavy one. And with a strong blast it was made higher than with a light blast, the height of bed generally being from 18 to 20 inches above top of tuyeres.

When the tuyeres were very high, 18 to 20 inches above sand bottom, and coke light, one to two pounds of iron were placed upon the bed to every pound of coke in the bed. And with a heavy coke two to three to one were placed on the bed.

With low tuyeres, four to eight inches above sand bottom, and light coke, two to three to one; heavy coke, three to four to one. The top of bed and also charges of fuel and iron were made as level as possible before putting in the next charge. For charges of coke, a sufficient quantity was put in to properly cover the iron (about four or five inches), and separate charges of iron.

On the charges of coke was placed from three to five to one with a light coke, and eight to ten to one with a heavy coke.

This means of determining the proper amount of fuel for bed and charges and ratio of iron on fuel, in bed and charges, seldom failed to produce satisfactory melting, which might or might not be improved.

To determine this, the melting was watched from the time the blast was put on until the bottom was dropped, for indications of necessary changes. All coke and iron was accurately weighed, the front put in and tuyeres closed, as soon as bed was properly burned for charging, and charging began from two to three hours before blast was put on.

If iron failed to appear at the tap hole in five minutes after the blast was on, the bed was too high, and for the next heat was reduced a little. If iron came dull at the latter end of charges, charges of iron were too heavy and were reduced next heat.

If the cupola did not melt rapidly, the charges of fuel were too heavy. If iron was not of an even temperature throughout a heat, charges of fuel and iron were not of a proper proportion.

All these things were noticed and changes made in the charging until the cupola melted the largest stream of iron it was capable of melting, suitable for the work to be cast, and of an even temperature throughout a heat.

When this had been accomplished, the most economical melting that could be done, in that cupola with the grade of coke used, was being done, and it did not matter whether two to one or ten to one was being melted, the per cent of fuel to iron could not be reduced.

The question of per cent of coke to iron or of the number of pounds of iron that can be melted to the pound of Connellsville coke is a matter upon which there appears to be a wide difference of opinion, and upon which

few are capable or willing to give definite practical information.

Periodically, there appears in the scientific and mechanical papers a good cupola record, in which the writer claims to have melted anywhere from 10 to 15 to one.

In Mr. West's work, "The Molder's Text Book," we find reports of melting with Connellsville coke from 24 foundries, in which the per cent of fuel to iron of no two of them are the same and the ratio of fuel varies from 3 83-100 to 11 4-10 to one.

In these reports the size of heats varies to a considerable extent, but the largest heats do not always show the lowest per cent of fuel to iron, and we find heats of 8,000, 10 to one; 41,000, 7.84 to one; 21,000, 5.91 to one; 3,500, 6.64 to one; and in very few of them do the largest heats show the best per cent of iron to fuel; which would seem to indicate that the old theory, that the larger the heat the smaller the per cent of fuel, was all wrong.

These reports indicate that the management of cupolas is very poorly understood by the majority of the foundrymen making them or that others through a desire to excel have misrepresented their melting, and we are inclined to believe the latter to be the case, for in all our experience in melting, we have never seen any such melting done, as reported by some of them; nor have we ever met a practical founder who made such extravagant claims.

Few practical founders claim to melt more than eight to one in their largest heats, and the majority of them do not state their average melting to be more than seven to one, and many place it even lower with the best of coke.

As stated above, the best and only guide the founder has to economy in fuel is fast melting and iron of a temperature suitable for work to be cast, and when he melts his iron as fast as a cupola is capable of melting, and of a temperature at the spout suitable for the work, he is doing all that can be done to save fuel, and no attention should be given to extravagant cupola reports made by other foundries.

Deaths.

James H. Harris, of Arlington Heights, Ill., died July 3d. He had long been engaged in light foundry work.

Ezra Greenwald, president of the I. & E. Greenwald Co., at Cincinnati, Ohio, and a pioneer citizen and manufacturer of that city, died there June 28. The deceased was 84 years of age, and was born in Frederick, Md. In the early '40s he, with his brother Isaac, came to Cincinnati, and in 1847 started the firm of I. & E. Greenwald, machinists and founders. In 1885 the concern became a stock company, and the deceased was made its president, which position he had occupied ever since.

Walworth O. Barbour, senior member of the Barbour-Stockwell Co., iron founders and machinists, of Cambridge, Mass., died July 2 at

WALWORTH O. BARBOUR.

the McLean Hospital, Boston, after a long illness. He was born in Saratoga, N. Y., about 50 years ago, and first started in business with the Walworth Mfg. Co. The firm of the Barbour-Stockwell Co. was formed over 20 years ago.

Jacob S. Rogers, former owner of the Rogers Locomotive Works, of Paterson, N. J., died at New York, July 2d.

Oscar Lewis, for many years one of San Francisco's prominent foundrymen, died recently, aged 64.

Frank J. Patterson, vice-president of the National Cash Register Co., at Dayton, Ohio, died suddenly July 4, aged 52.

William J. Early, head of the firm of W. J. Early & Sons, foundrymen, of Pittsburg, died June 28 at his home on the South Side after an

illness of two months. Mr. Early was a native of Butler county and went to Pittsburg 36 years ago. He was for many years a foreman in the foundry department of Jones & Laughlins' mill. About 12 years ago he went into the foundry business for himself with his two sons, under the firm name of W. J. Early & Sons.

John Martin Long, of the Long & Allstatter Co., Hamilton, Ohio, died recently. He was born in the village of Mettingen, Westphalia, October 14, 1825.

Harry P. Doane, superintendent of the Morgan Engineering Company, Alliance, Ohio, died on July 1, aged 45 years.

John A. Slater, superintendent of the Norwalk Iron Works, died suddenly on July 13 at South Norwalk, Conn., aged 65 years. He was a native of Portchester, N. Y.

Stephen E. Cleaves, superintendent of the Portage Lake Foundry & Machine Co. at Houghton, Mich., died July 13. He was born in Saco, Me., January 22, 1827. He first became connected with the foundry business in the copper country in 1867 under the firm name of Shelden, Wanzen & Cleaves. In 1879 he started the Eureka Iron Works and five years later the present works were purchased. Since 1896 these have been operated by a stock company, Mr. Cleaves being retained as superintendent.

The Slag Hole.

People who use the slag hole for the first time are almost certain to get it too small. Slag melts at a much higher temperature than iron, and, when exposed to the outside air, congeals very quickly. So, if the slag hole is small, it will become clogged by solidification of the slag.

I do not know just how large a hole to advise, but I use one about three inches in diameter and shall continue to do so, no matter what anybody else does, as this gives the best results in my practice.—[E. H. Putnam in *The Tradesman.*

Ground has been broken at Chicago Heights, Ill., for the plant of the Hicks Locomotive & Car Works. The main building will have a frontage of 810 feet; the machine shop will be 100 x 350 feet, erecting shop 170 x 750 feet, foundry 100 x 300, office 30 x 70, besides a large building for storage purposes. The plant will be equipped with modern appliances throughout and will employ a force of 350 men.

Among the Foundries.

The Kalamazoo Stove Co., Kalamazoo, Mich., was incorporated June 24, with a paid capital of $65,000. The following officers were elected: Edward Woodbury, president; Wm. Thompson, vice-president and general manager; Chas. A. Dewing, treasurer, and A. H. Dane, secretary. Wm. Thompson, the vice-president and general manager of the company, was formerly superintendent of the Buck's Stove & Range Co., of St. Louis, and at present is superintendent of the Cribben & Sexton Co., of Chicago. A. H. Dane, the secretary, is at present representing the Michigan Stove Co. on the road, and is well known to the stove trade of the North and Northwest. The company will erect a modern stove plant at Kalamazoo. The main building will be 350 x 120 feet, and it is the intention of the company to put on the market a complete new line of steel ranges, cooks and special heaters. The present address of the vice-president and general manager is 633 North Boulevard, Oak Park, Ill., where all communications intended for the company should be sent.

C. S. Reynolds & Co., of Columbus, Ohio, have become incorporated with a capital stock of $100,000 under the style of the Pioneer Stove Co., with the following officers: George W. Lattimer, president; G. B. Kauffman, vice-president; Allen W. Williams, secretary and treasurer. This business was established by John L. Gill in 1826.

J. R. Kirkpatrick, of Kendallville, Ind., has purchased the foundry and machine shop at Sturgis, Mich., which has been idle for some time. He proposes to add a brass foundry to the works in the immediate future.

The Union Foundry & Machine Co., Catasauqua, Pa., are building an addition to their plant, 105 x 100 feet. It will be fitted with electric crane and improved core ovens to secure dispatch in the filling of orders.

The Crane Co., of Chicago, has commenced the construction of a large foundry at 219 to 239 South Jefferson street. The building will extend over a space 237 x 90 feet in size, and cost about $40,000.

The W. B. Sherman Mfg. Co., of Greenville, Ill., is erecting a machine shop at that point and will later add a foundry. The concern is capitalized at $80,000.

The Lennox Mfg. Co., of Marshalltown, Ia., is erecting one of the most complete foundries in that part of the country.

J. W. Bryant, proprietor of the Eagle Foundry, at Minneapolis, Minn., will erect a new

foundry 60 x 100 feet. Two cupolas, two cranes and trackage through the shop will be part of the equipment. General machinery has been the Eagle Foundry's line of work, but Mr. Bryant proposes to go into the structural iron work also when the new plant is started up.

A general jobbing foundry business is to be handled by Archibald J. Dobbie, Niagara Falls, N. Y., under the name of the Niagara Iron & Brass Foundry. Mr. Dobbie has purchased the equipment of the foundry formerly conducted by P. H. Tuohey, and will add a number of new tools.

The Co-operative Foundry, at Detroit, Mich., owned by Stuart Bros., will be moved into a new plant 50 x 250 feet, for which plans are now being prepared. The estimated cost is $10,000.

The United Engineering and Foundry Co., of Pittsburg, which has been organized with a capital of $5,500,000, will absorb four of the largest makers of rolls and rolling mill machinery in the United States, made up of the Frank-Kneeland Machine Co., Lincoln Foundry Co., McGill & Co., all of Pittsburg, and the Lloyd-Booth Co., of Youngstown. It is possible that one or two more concerns may be taken in. It is stated by the promoters that in any case the number of firms combined will not exceed six and that probably the number will not exceed four. If the number is increased the Seaman-Sleeth Co. will be included. The Frank-Kneeland Co. and the Lloyd-Booth Co., of Youngstown, make chilled and sand rolls and rolling mill machinery. The Lincoln foundry makes chilled and sand rolls only, while McGill & Co. make rolling mill machinery with a specialty of hydraulic work and tables, but not rolls. The plan of the promoters is to preserve the individuality of management and plants as now existing, the advantages sought being mainly the concentration of various classes of work at different plants and the elimination of duplicating costly patterns.

The Flour City Ornamental Iron Works, of Minneapolis, Minn., will, in addition to other buildings, also erect a foundry for the casting of iron and brass, and will thus be in a position to furnish structural and ornamental iron work complete. It is proposed to install the latest and best foundry equipment.

The Chicago Ornamental Iron Co., whose plant is at present at Twenty-sixth and Halsted streets, Chicago, have bought a site 250 x 350 feet, at Thirty-seventh street and Stewart avenue, and will soon commence the erection of a plant. It will probably consist of a foundry 50 x 150 feet, a machine shop 70 x 150 feet, a pattern shop and storeroom 50 x 100 feet, and an engine and boiler house, and a plating room 40 x 150 feet. The factory will be equipped with the latest appliances, and the company will be enabled to take care of twice as much business in their new place as in their present location. It is expected that the plant will be in operation by September 1.

St. Clair Foundry, Belleville, Ill., jobbers and manufacturers of machine castings, are rebuilding the part of their plant that was recently destroyed by fire. The cupola and blower were only slightly damaged. They will be able to operate the foundry within the next two weeks. The finishing department, being entirely destroyed, including all machinery, will be replaced as rapidly as possible. Aug. C. Wiechert, Fred. Wiechert and Wm. Althoff are the proprietors.

The American Machine & Foundry Co., Hanover, Pa., have lately added to their foundry building two large core ovens with the necessary core trucks, etc., to take care of the large and heavy cores for contracts on hand. They have also added a flask shop and pattern storage building 70 x 40 feet, using their old building for a foundry cleaning room.

The Foran Foundry & Mfg. Co., Flemington, N. J., makers of light and heavy gray iron castings, are building an 80 x 40 foot fireproof extension to their pattern store room.

The American Wrought Iron Casting Co., of Detroit, Mich., will erect a manufacturing building 70 x 35 feet, an addition to the present plant.

The F. E. Reed Co., of Worcester, Mass., manufacturers of machine tools, is having plans drawn for a big foundry to be constructed in connection with its plant. Since Mr. Reed sold out his interest in the Kabley foundry, the company has no place of its own where it can get its special castings, and the plans are being prepared for a new foundry, which, if erected, will be one of the best and most up-to-date in this section of the country. The company has not decided to build yet, but the plans are being prepared to see if it is advisable to put up the new plant.

The Ellington Mfg. Co., recently organized at Quincy, Ill., will erect a new plant which will consist of a foundry 208 x 210 feet, machine shop 63 x 227 feet, annealing shop 90 x 134 feet, store and shipping room 60 x 134 feet, blacksmith shop 50 x 70 feet, and a pattern shop. They expect to be ready for business early in October. Gas and gasoline en-

gines, rock crushers, etc., will be manufactured. A malleable plant will also be added. The officers are W. T. Dwire, president; W. S. Bogle, vice-president, and H. T. Asbury, secretary and treasurer.

John Ramsey, who has been operating a foundry at Ohio and Kingsbury streets, Chicago, has associated himself with Robert Barr, for many years superintendent of the foundry of the Western Electric Co., Chicago, and they will operate a foundry under the firm name of John Ramsey & Co. They are having a plant erected at Fifteenth and Lincoln streets, Chicago, which will be equipped with the latest foundry appliances.

A new foundry is being established at Mountain Grove, Mo.

The Ollard Iron Works, at Tacoma, Wash., which started its foundry but a short time ago, has found itself unable to supply the demand for castings and is now arranging for an extension which will double its capacity. A traveling crane will cover the full length of the shop and a cupola of fifteen tons capacity will be installed.

The Dempster Mill Mfg. Co., Beatrice, Neb., manufacturers of windmills, pumps, tanks, etc., are enlarging their plant by building additions to the machine shop and foundry, and by the erection of a new complete galvanizing plant for galvanizing windmills and windmill material. The cost of the additions, with the new machinery which will be installed, will be about $20,000, and the capacity of the machine shop and foundry will be increased about one-third.

The Gartland Foundry Co., of Cleveland, O., is doubling its capacity, and has installed a new cupola and other equipment.

The Oregon Iron Fence & Foundry Co., of Portland, Oregon, has changed its firm name to the Oregon Foundry Co.

The Youngstown Foundry & Machine Co., of Youngstown, O., will increase its capital stock from $50,000 to $75,000, and a number of improvements will be made, among which will be an extension to the main foundry building and the installing of two large electric traveling cranes. Other improvements are contemplated, but as yet the extent of them has not been fully decided upon.

It is reported that John Christensen will start a foundry at Spencer, Ia.

The Philadelphia & Reading Railway Co. is having plans prepared for a new foundry, carpenter and pattern shops, at its Reading, Pa., shops.

W. P. Day & Co. are erecting a new foundry at Cleveland, O.

The Duncan Foundry & Machine Co., of Alton, Ill., is planning to move its works to a new site, where greater facilities can be provided.

The Hart-Parr Co., of Charles City, Ia., are having plans prepared for a new factory which will include a foundry 60 x 60 feet.

Work has begun on the new plant of the James Barker Foundry & Machine Co., at Sixth and Cayuga streets, Philadelphia.

The Jenkins & Cunningham Foundry, at Shafton, Pa., has been purchased by Messrs. C. D. Sensinich and Louis Malone, who will operate it under name of Irwin Foundry & Mfg. Co., with office at Irwin, Pa.

W. H. Rotermund has started a new foundry at Eureka, Cal.

The C. B. & Q. R. R. is increasing the capacity of its brass foundry at Plattsmouth, Neb. Among other improvements eight new furnaces have been built.

The Kidder Press Co., of Dover, N. H., is taking contracts for outside work, having a greater capacity in their foundry than needed by themselves. David Spence is in charge of the foundry department.

Thomas Carlin's Sons Co., Allegheny, Pa., manufacturers of engines, boilers and pumps, hoisting engines, contractors' machinery, grinding pans, rolling mill machinery of all kinds, and shears, are having a steadily increasing business and have found it necessary to start another foundry. This firm now occupy about 1,500 feet frontage on River avenue, Allegheny. When they moved their works from down town to the present location, about ten years ago, the firm occupied only 200 feet frontage. Their additional foundry will employ from 50 to 100 more men and will increase their output very materially.

The American Malleable Casting Co., who are building a large plant at Chicago Highlands, Ill., and whose main office is in the Chamber of Commerce Building, Chicago, are so far advanced that they are prepared to take contracts for malleable castings.

The Wisconsin Foundry & Mfg. Co. has been organized at Racine, Wis., by Henry Grede, Fred W. Glahn and H. W. Hayden.

Joseph Gearth has leased the Bain foundry at Altoona, Pa., for a term of seven years, and will place the same in operation.

The Sanitary Enameling Co., of Milwaukee, has increased its capital stock from $15,000 to $30,000, and will proceed at once to build a

foundry 250 x 85 feet in size. It is to be ready in two months, and the company will manufacture bath tubs, lavatory sinks and other plumbers' supplies which require enameling. The following officers have been elected: President, R. G. Hayssen; vice president, H. Hayssen; secretary and treasurer, A. Hayssen.

Chimmie Powers' Answers to Correspondents.

Young Reader: You win, de wasted metal, as you call it, sets just as quick in de summer, as it do in de winter.

Otto: De definition of de word Flask is a broad one; a Flask holds sand in a Foundry, an it also holds 'skee ina s'loon, a Stein holds Beer, but de word Flask kin be safely applied, or substituted fur Stein an no offense can be taken, "less by sum one which don't u"stan," fer instance; put yer Nickel down an say: gimme a Stein of Beer; er a Flask of Beer, an de result would be de same.

Oscar C.: You must have practical experience to learn de Molders trade, reading books alone will do no good, dat would be nuttin" but "Absent treatment."

Mike Mack: It happened like dis: Sandy was pourin" a wheel Chill, whit de Crane Ladel, an it was runnin out ina stream as thick as a mans leg, a nigger took de cover off de riser, looked down, an ses, pour in hard Sandy, yo" ar" gainin" on it

Harrison I. Goodwin: Write to de Green Sand Editor of dis Paper.

Chicago Ill 6, 3, 1901

Am living in the midst of three very large Foundries, and having noticed how beautiful the buildings look at night with their blare of electric light, and brilliant display through the Cupalo Stacks, have thought of entering one and work from the ground up to learn the entire business; how should I proceed.

A. C. DREW.

Go into de office whit yer Golf suit on, but geta note frum yer minister first just tu introduce yo, state yer case modestly, (but never use bad language) an plainly, be brief, fill outa blank, givin" yer name, age, an address, making a note at de bottom sayin" you would like to start as a Molders third helper an work yer way up, de rest will be easy.

Abner: De term "House Work' Molder does not mean dat one of dis class could fill de bill as a domestic servant if necessary.

O. Reilly: (1) Gimme a lift off: or gimme a lift here: either is correct, it is not good form to swear when callin' fur dis class of service. (2) It is said dat de western Foundry in Butte Mont use tu pay off in Coon skins at one time, but not now. (3) Geta good Molder tu light de gas an yu"ll never have any trouble uv that kind. (4) Never grab holt uv de live end uv a skimmer, approach it cautiously.

Mudding Up.

I have read a short article in the July issue of THE FOUNDRY entitled, "Mudding Up," and on this subject I do not agree with the writer, because this plan for avoiding run outs is not a good one. In the first place it is setting a bad example for the younger men in the shop, and as a natural result they will grow up in the business with the idea that mudding up joints is a strict essential in the molding trade. Should they ever assume the responsibility of running a foundry in many cases it would be hard to convince them that a molder can not make as good work in an old flask with a mudded up joint as he can in a new flask with a good joint and no mud. To prevent run outs we must make a good, true joint or parting and tuck the bars well in our cope so there will be no danger of a soft spot under the bars. This is often the cause of a run out. The molder will heap flour and dough balls on the joint of a green sand mold and plaster mud behind the grate and then wonder why it runs out. An investigation will often result in finding that a soft spot under the bars in the cope causes the trouble.

We not only require a good joint to prevent a run out, but also a good flask; if the flask is poor, build a new one. Patched up affairs are both dangerous and expensive.

Another objection to mudding up the joints of a mold is, it prevents the gas or vent from coming off freely, as often the joint of the mold is the only avenue of escape for it.

No, I do not think it policy to mud up the joints of green sand molds.

As I stated before, a good, true joint and a good flask will insure a good casting; while the mudded or patched up affair is very uncertain.

P. R. RAMP.

Aurora, Ill.

Pattern Making—Pipe Work.

It often happens in shops where engine work is done, and doubtless in many other places, that pipe fittings are wanted of large diameter and of odd shapes, and that probably will not be used many times, if, indeed, more than once; and so it becomes necessary to reduce

the pattern work to a minimum of time and expense.

The examples given here are but a few of the necessary shapes liable to be dealt with in actual practice, but will serve to show how jobs of this kind are sometimes handled, giving one of the many various ways of accomplishing a given result.

D having a semicircle equal to the outside diameter of the required pipe, this to work over the board A between flanges B B. This completes the pattern. The molder packs sand over the board A, shaping it properly by means of the strike D. We now have the same shape as we should if the pattern was entirely of wood. Newspaper is next put smoothly over

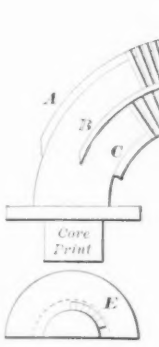


FIG. 1.

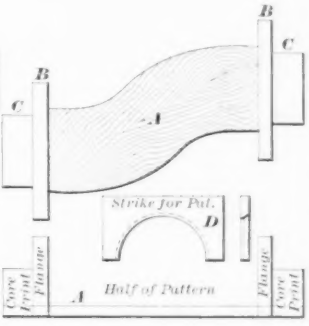


FIG. 2.

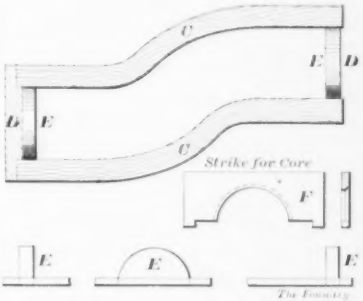


FIG. 3.

Fig. 1 shows a method of lagging a quarter turn, when it is necessary to increase the diameter for some special use, and which would be an awkward job, as well as a long one, if the whole surface was to be covered: but that is not necessary if only temporarily used. Ascertain first the inner, middle and outer radius of curvature of pipe at A, B and C, then band-saw to these curves six strips having a square section equal to the thickness of the required lagging, and attach them to each half of the pattern, as shown at A, B and C. Now get out a lot of pieces D, having the same inner radius as the outside of the pattern and the same width and thickness as A, B and C, and nail them to the pattern between the long curved pieces, as close to each other as they will lie conveniently. It will be seen that there is no "cutting and trying" or fitting with chalk in this method, as everything is used direct from the band-saw, and the molder simply fills up the interstices between the strips with green sand, and then uses parting sand over all. The prints will of course be covered in the ordinary way, as shown at E.

Figs. 2 and 3 show an offset pipe pattern and corebox with very little pattern work. Lay out the shape of the pipe and the prints on a board; dowel this to a second board of the same thickness, and band-saw the outline. Bevel the edges of each board slightly to conform to the curvature of the strike, then attach flanges and prints, as at B C, and make a strike

the green sand form, to act as parting sand, and the mold rammed up as with a common pattern. When the flask is turned, the cope is put in place and done in the same manner. Finally, when the board with the flanges is

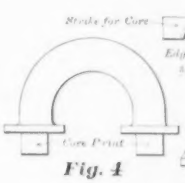


Fig. 4

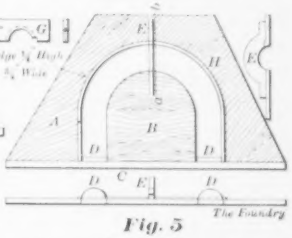


Fig. 5

withdrawn, the sand remaining is easily removed, being separated from the mold by the paper previously mentioned.

The corebox, or more properly, the frame, is shown in Fig. 3, and is very simple, consisting of two curved pieces of strips C C, of sufficient width to prevent springing, and parallel their entire length, with two ends D D of the same thickness. The length of the frame inside is as much longer than the board A, Fig. 2, from end to end of prints, as the thickness of the two heads E, which are fastened with screws to each end of the frame. The core is rammed on a plate and struck off with the sweep F, thus allowing the frame to be lifted off without disturbing the core, which is quite an item, for it is a job to turn heavy core boxes open and lift them from the core. It will be noticed that

this job requires one right-hand and one left-hand core. To make the opposite one, simply unscrew the heads E E, turn the frame the other side up and screw them on again, using the same strike F as before.

Fig. 5 shows a core frame for the U-pipe in Fig 4. It consists of a wide board A, with the outline of the outside of the core sawed in it. B is the same thickness, being the inside outline of the core. C is an end strip to hold the two parts in position. D D are two heads having the same diameter as the core, and E is a bridge piece to strengthen the frame, shown more plainly in section at the right. The half circle just matches that of the strike G. A little ledge H, ¼ inch high and ¾ inch wide, is nailed around the opening on board A to guide the strike. It will be observed that there is a place cut out in the strike G to match this ledge, and that the center of the curve is as much below the bottom edge as the thickness of the board A.—[John M. Richardson, in American Machinist.

Gun Metals.

The term "gun metal" originates from the use of various alloys of copper and tin for the founding of ordnance. Steel forgings have replaced copper alloys for this purpose but though ousted from this field gun metals possess many properties which make them specially useful to the constructive engineer, boiler maker and machine builder.

Triple alloys, that is to say, alloys of copper, tin and zinc have replaced the old dual ones and hence the term gun metal is not confined exclusively to alloys of copper and tin. Indeed in many of these alloys the presence of four or five metals may be found in distinct amounts. Zinc, lead, aluminum and manganese are frequently added for specific purposes and therefore we may include within the term gun metals any alloys in which copper and tin are the essential constituents, and which possesses strength and toughness. As these alloys are chiefly used for engineering purposes "machine brasses" would be a more suitable term, but to introduce such a synonym would be rebelling against tradition and who dare do that?

The properties of gun metals naturally vary with each individual alloy and may range from a metal of extreme hardness down to a ductile and easily extensible one. Properties common to each alloy are not to be expected but a general grouping is permissible in most of the gun metals used in engineering practice. This grouping would include the following common properties.

The alloys must be more or less tenacious and in the form of castings offer good resistance to torsional strains. A requisite property from the founder's standpoint is that the alloys shall freely melt and when molten be capable of forming clean, solid and homogeneous castings.

The range in composition of gun metals is very extensive and nearly all brass founders possess—apart from specification work—pet mixtures of their own for varying purposes which differ but slightly and not unfrequently in unimportant constituents from those used by their neighbors for the same class of casting. At the same time we must recognize that these differences in composition, often minute, may mean the suitability or otherwise of a casting for the work it has to do. For instance a low percentage of a deleterious element in the alloy used for a bearing brass may cause untold mischief in the matter of hot bearings, etc. Similarly alloys used for high pressure boiler fittings may utterly fail through a minute difference in composition. Taking into account these varying conditions an attempt will be made to group and average the composition of gun metals in ordinary every day use and afterwards to indicate in a general manner influences and conditions which tend to make or mar the resultant alloy.

The higher qualities of gun metals such as are used for high pressure boiler mountings and steam valves range in composition as follows:

Copper from 88 to 86 per cent; tin 10 to 8; zinc 2 to 6.

Alloys within this composition, in addition to the use indicated above, are also used for the general run of high quality work in which purity of constituent metals, strength and rigidity of the alloy are essential factors. The tensile requirements expected from this series range from 12 to 16 tons per square inch and 8 to 14 per cent extension on 2 inches. This series affords alloys of good quality, but they are costly and those in which tin is high and zinc relatively low are, as the composition would indicate, hard to machine. Good alloys for the average casting are made up of:

Copper, 80 per cent; zinc, 8; tin, 6; lead, 6; or copper, 80 per cent; zinc, 10; tin, 5 per cent; lead, 5.

Proportions within these limits give useful alloys. They are easily handled in the brass foundry and in the machine shop are manipu-

lated with ease and rapidity. Merchant qualities of gun metal generally contain more or less scrap. This scrap usually bought from dealers in old metal is not by any means uniform in composition and therefore requires sorting and grading with care. A typical composition of such an alloy is copper, 70 per cent; zinc, 4; tin, 4; lead, 4; scrap, 18.

This composition is only a typical one, for according to the quality of the scrap almost any grade of alloy can be produced, and as the scrap is so uncertain no definite composition can be given. The addition of lead up to a certain point enriches the color of gun metal, a further factor is that it facilitates turning or machining, by no means an unimportant item in the case of repetitive work and it is hardly necessary to add that the presence of this metal lessens the initial cost of the alloy. Gun metals for shaft bearings, slide valves and all purposes in which the castings have frictional stresses to meet are usually made from a harder composition than that of the average quality.

They range from copper, 80 to 82 per cent; tin, 10 to 14; zinc, 2 to 4. A good serviceable alloy for this class of work consists of copper, 84 per cent; tin, 12; zinc, 4. A cheap and hard bearing metal may be made up from copper, 51 per cent; tin, 8; hard gun metal scrap, 41.

To a certain extent gun metals are being replaced by the bronzes, phosphor bronze in particular, or by white antifriction metal for shaft bearings and similar purposes. In the case of an antifriction metal the bushings are cast of gun metal, iron or steel as the case may be and afterwards lined with white metal to a thickness varying from 3-16th inch to ⅜th inch. The advantages of such a lining are obvious, chief of them being its ready renewal.

The preparation of any alloy is a matter requiring care and skill. In making up gun metals the constituent metals may be alloyed and cast direct into sand molds or they may be poured into ingots and afterwards remelted for castings. In the latter case the requisite amounts of tin and zinc are added to molten copper and the contents of the crucible poured into ingot molds. Care is taken not to overheat in order to prevent undue loss by volatilization. These ingot molds have distinguishing marks for the different grades of gun metal in use, thereby diminishing the risk of error. The ingots are stocked in their respective qualities and drawn on as required for remelting into castings. This plan gives a more homogeneous casting and is usually adopted for the higher grades of work. For the general run of castings the alloys are used direct or in conjunction with foundry scrap. For instance the charge for a 150 lb. crucible can be conveniently divided into 100 lbs of new metal and 50 lbs. of scrap. This scrap is always graded according to its particular quality and to ensure this a system of marking gates and runners is adopted. In working with four grades of metal the runners of such may be respectively marked with 1, 2, 3 or 4 small dots pricked into the sand by the molder.

During melting the alloys undergo more or less change, notably: (1) Loss of volatilization, as is the case with zinc, arsenic, antimony and phosphorus. (2) Oxidation, as in the case of copper and to a certain extent tin. (3) Absorption of gases in all cases.

The loss due to volatilization can be determined and allowed for in weighing out the charges. This loss will vary with different furnaces, but once the work of the furnace is known an average loss can be readily arrived at and used as a standard. If the working conditions are kept fairly uniform no great variation will be found in this standard.

Oxidation is in most cases overcome by the suitable use of deoxidizing agents and to a certain extent the treatment of an alloy containing occluded gas follows the same plan.

The rate of melting is a matter of some importance and the ideal condition whether in crucible or reverberatory furnace is to gradually bring the alloy to a red heat and then quickly melt and heat to the requisite casting temperature. As is well known dull, pasty metal is extremely liable to absorb gases, acting in the manner of a sponge. With rapid melting the conditions are not so favorable to the absorption of gases. It must not be taken that quickly melted alloys do *not* absorb gases, but that the conditions, in the case of dull, pasty metal lying in the furnace and only slowly gaining heat, are much more favorable to this absorption.

The importance of casting temperature in the case of steel has been shown by Professor Campbell. In the case of alloys and particularly gun metal alloys this temperature is of equal importance. The alloys high in copper and tin and relatively low in zinc are extremely sensitive to the temperature of casting. Unless this temperature be correctly judged the casting will be a failure on mechanical or hydraulic testing. Gun metal castings, especially those in which the content of zinc is below 2 per cent which fail to reach a specified

test, do so in many cases owing to the physical condition of the alloy rather than to the presence of impurities. Everyday experience in the brass foundry emphasizes the importance of this question—that of initial casting temperature of alloys high in copper and low in zinc. As an instance the writer may cite from one of many similar that have come under his observation, the following example which occurred not in the experimental laboratory, but in actual works practice. Several gun metal castings weighing from 2 to 3 cwts. each and of an approximate composition copper 89 per cent; tin, 9 per cent; zinc, 2 per cent; were condemned. The castings machined up all right and to all outward appearances were perfectly sound, but they absolutely failed in service. They broke with ease and the fractures were not at all characteristic of gun metal. The segregation of copper and tin was quite distinct and the whole appearance of dark brownish copper-colored patches interspersed with light grey tin was not one calculated to inspire the observer with confidence as to its mechanical results. All the fractures, without exception, gave every evidence of a low casting temperature. Test pieces taken from different positions on the several castings gave, on mechanical testing an average of 6 tons per square inch; 3 per cent extension in 2 inches.

To show that these results were due to physical conditions rather than to the presence of an impurity, remelts were taken from each of the castings and bars were cast at the correct temperature. No additions were made—the metal in each case being simply melted and raised to the necessary temperature and the test bars poured. The average of these tests were 15.5 tons per square inch; 12 per cent elongation in 2 inches.

A "drawn" casting is often the result of too low a casting temperature. These draws take several forms, commonly they occur as cracks, which are often confused with contraction cracks, running along the junction of a flange and body, or other parts of a casting where thick and thin sections of metal are in juxtaposition. In other instances cavities or depressions are formed on heavy sections, bosses or the like. These cavities often contain a button high in tin, evidently the mother liquor of the alloy, which has the appearance of having oozed through after the cavity had formed and the major portion of the metal solidified.

Dull metal often results in a porous casting, and many valves, gauges, boiler mountings, etc., which fail on high pressure test do so owing to the fact of having been cast at too low a temperature.

Gun metals in common with all metals and alloys suffer from the presence of impurities in varying degrees. Some of these impurities affect the properties, when present in the most minute quantities; others only act in a deleterious manner when present in distinct amounts. It is hardly possible to consider fully the action of all such impurities, whether present in mere traces or in fairly large amounts, and therefore only a cursory glance will be taken of one or two of the more familiar impurities. Oxygen has an affinity for many metals; silver is perhaps one of the best instances of this affinity; this metal when melted in air dissolving 22 times its bulk of oxygen and eliminating the same on solidification. Steel possesses the power of dissolving oxygen which, in this case, unless special means are resorted to, is not eliminated, being found disseminated through the mass of cold steel as ferrous oxide. Copper in common with other metals has an affinity for oxygen, as all who have attempted to make pure copper castings in sand know from experience. This oxide of copper may be dissolved in the body of copper or it may exist in a free state mechanically held by the copper. If this copper is used for making gun metal, unless the surplus oxygen be eliminated the resultant alloy will not be possessed of very high physical properties. There are many deoxidizing agents in use and fortunately one of the very constituents of gun metal, zinc, acts to a certain extent as such. The function of a deoxidizer is to combine with the oxygen present and eliminate it, generally as a gas or slag. Hence in melting alloys the almost universal use of charcoal which is one of the most familiar of reducing agents. The charcoal is used as a covering for the alloy, it floats on the surface, prevents atmospheric contact and tends to reduce any oxides which rise to the top. Manganese in the form of cupro-manganese if used as a deoxidizer will combine with oxygen forming oxide of manganese—a slag. Sodium carbonate and potassium nitrate may be used alone or in combination with each other as reducing agents, a slag being the result. One objectionable feature of a slag is the erosion of the crucibles and if considering the working life of these crucibles it is well to keep down the slag and use such fluxes as sodium carbonate or potassium nitrate in conjunction with charcoal which will absorb most of the slag

formed. Phosphorus is a most active deoxidizing agent and in works practice is used in the form of phosphor copper or phosphor tin containing respectively 15 and 5 per cent phosphorus.

The action of this metalloid is very energetic, and when used as a deoxidizer only minute quantities should be added, .02 per cent phosphorus is about the maximum in ordinary practice. The greater part of this "trace" will slag out and only a minute quantity be found in the alloy. Silicon acts in a similar manner and as it may be obtained in combination with copper it is fairly easy to handle. Either the phosphor copper or the silicon copper may be used for producing sound copper castings and in such small amounts that little or no phosphorus or silicon can be detected in the casting.

The effect of arsenic on copper and incidentally on gun metal is noteworthy. [1] Tenacity of ordinary copper at 300° Cent., 9.38 tons per square inch. Tenacity of copper and .2 per cent arsenic at 300° C., 12.6 tons per square inch; hence the preference of the locomotive firebox builder for the older brands of copper in which the removal of arsenic is not carried to total elimination. The tensile tests given above offer much of a suggestive nature to the makers of gun metal high pressure steam fittings.

The effect of bismuth on the structure of copper has been shown by Professor Arnold,[2] the tendency of bismuth when present in "traces" being to envelope the crystals of copper. The low tenacity of copper containing bismuth is recognized and these envelopes, surrounding as they do comparatively ductile crystals, account for the brittleness. As Sir W. Roberts Austen [3] has shown these brittle meshes are easily fusible and liquefy or soften at comparatively low temperature. The reason for the rapid fall in tenacity, with increase of temperature, of copper or its alloys contaminated with traces of bismuth is therefore apparent.

The study of the influences of impurities on metals or alloys is a wide and interesting one, though for the present too wide for the purposes of this article. Purity of constituent metal is, though not always procurable, generally recognized as being desirable and the importance of physical conditions has been shown.

PERCY LONGMUIR.

[1] Alloys Research Committee, 2nd Report.
[2] Engineering, Feb. 7th, 1896.
[3] Alloys Research Committee, 2nd Report.

Molding a Casting by Bedding In the Floor.

Fig. 1 shows the side of the casting and Fig. 2 the top of the pattern. The system of bedding patterns in the floor in the foundry, or, as molders term it, "bedding-in," has many ad-

Fig. 1

vantages in point of economy over the system of molding everything in a flask, and it is a necessity to the jobbing foundry making a great variety of work. The specialty foundry has the advantage usually in having in use certain patterns for which it specially fits up flasks. Yet the amount of space occupied by the flasks of one of the large foundries of to-

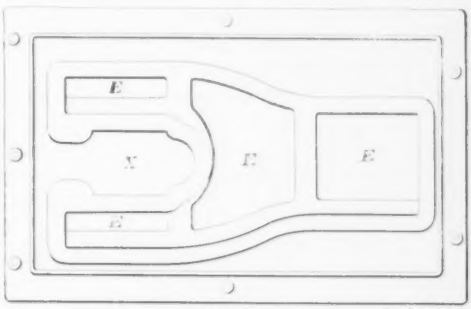
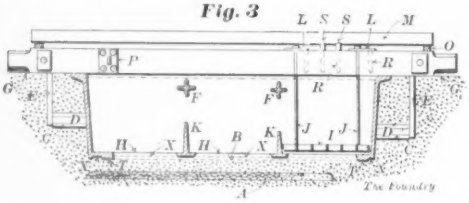


Fig. 2

day is very large, and in many cases the ground rent amounts to considerable. In bedding-in work one cope may answer for many molds, often without alteration, as long as it is large enough to cover the pattern, and leave enough for a joint, while cheeking-off is done by the use of cast iron plates and lifting out the sides or ends of the mold. Many times this can be done in bedding-in work and the pattern may be molded in less time than in a flask by one accustomed to making castings in this way. To a molder accustomed to a flask for everything, such a statement may seem erroneous, yet one firm who was accustomed to have a certain casting weighing some 6,500 pounds made by bedding the lower half of the pattern in the floor, concluded that it looked as though, were a flask made for it, or, rather, a drag, used in connection with the cope, the pattern could be molded more quickly, thus making a saving; but actual practice developed that it could be made just as quickly by bedding-in the drag half. So the new way was abandoned.

In some parts of the country, comparatively small castings are made in the floor. In speaking favorably of bedding-in work, I refer to the larger castings, though not necessarily referring to those extremely large. Referring to the city foundries as being obliged to resort to bedding-in work, the men employed in them are usually adepts in the system of bedding patterns into the floor.

Fig. 3



In the accompanying sketches, Fig. 3 shows the sub-base for an engine, bedded into the floor and the inside of it lifted out by the use of anchors. Perhaps some molders will call them carcasses, others grids, as I have heard all these names applied to them.

The pit being dug the required depth, a cinder bed, A, is put in, with gas pipe running above the floor from it for carrying off the gas. Sand is rammed on the cinders to the required height, shown at B. This sand is leveled off, and a light coating of sand riddled on. The pattern is then set on this bed, and lightly rapped down, and then lifted off. Where the chipping pieces come, as at T, the sand is dug away to conform to the general outlines of the pattern, also where the bead runs around the top of the casting. A coarse vent wire is next used, and the bed is vented down to the cinders.

Molding sand is now riddled on to a depth of some ⅝ inch, being leveled off evenly in thickness. About the same amount of facing sand is riddled on top of it. The pattern is now placed on this bed, and rapped down as near as possible ¼ inch. The pattern is now staked at the corners, then removed and the bed is gone over with a fine vent wire, the fine vents running down to connect with the larger ones referred to. The face of the mold is now finished to a certain extent, being gone over with the hand and any irregularities felt are attended to, also all vent holes are stopped up. The pattern is now replaced and tucked up around the outside with facing. Pig iron is placed inside of the pattern to keep it in place while the sand is rammed around it, the stakes being pulled up. Openings shown at E, Fig. 2, are rammed up and struck off flush with the plate of the ribs K K, thus forming the joint between these ribs at H H, Fig. 3.

The outside is then rammed up to the seat of the cores for the runners, as c c, which seat is made by sweeping a level place for the core to rest at the required height. Gate-sticks E E are then set, and tie-braces, as F F, are placed, held in place by pins, which are removed as the sand reaches them. As each ramming is finished the pattern is faced for the next. On one side of the pattern, not shown, are loose pieces forming two pockets on the outside of the casting. These pockets are well rodded and vented, and the patterns for them are drawn in after the main pattern is drawn. The outside being rammed up, the joint at the top is struck off.

Some ¾ inch of facing sand is now spread over the inside of the pattern, and on joint H H, tie-braces having been removed. Anchors, such as seen at I, are next placed on this bed, and gently rapped down to a bearing. Three anchors are used to lift out the inside. The rods J J are screwed into them. The cope is next tried on and located. In case any rod is too near, or interferes in any way with the bars of the cope, it can be easily bent to one side, and no trouble will be experienced. The cope is now removed, and the inside of the pattern is rammed up, being vented after some 6 inches of sand is rammed in, cinders being put in at this point after venting in such a way as to form pockets. At the right time tie-braces are put in place and the whole is rammed up level with the outside, facing sand being used only in front of the gates on the sides. The cope is now replaced. Gate-sticks and risers are set and rammed up.

I will call attention to a piece of plank, E, Fig. 4, running under the corner of the flask. In case the cope is really smaller than wished for, and if one is afraid that in weighting there is danger of crushing or caving in the sides of the mold by overweighting, pieces of plank or board placed under the corners will be found a safeguard against such an accident. If you cannot get a stake in the corner of the flask, nail a cleat on the side and let the stake bear against that. When trying on the cope, rap it down to a good bearing. Do not let it bear on the corners and not in the middle or *vice versa*. Be sure and have a good bearing and a good joint. It makes lots of difference, but yet do not wear out a trowel slicking a joint. If for any cause there seems to be a possibility of a job straining out at the joint, lay some pieces of pig iron a few inches

away from the side and ram in sand between.

The cope being rammed up, pieces of iron are dropped down over the ends of the bolts J, with the ends of each resting on two bars, as at c c c, Fig 4, and L, Fig. 3. As there are slots in these, allowing them to be moved back and forth, a washer is dropped on the bolt and the nut run down home and tightened. When ramming up the cope at each corner of the pattern, a gate-stick is rammed up, set on the pattern. A heavy vent wire is punched down through the cope to the cinder pockets to bring up and carry off the vent or gases.

As everything is ready, the crane is hooked on, and, as the strain tightens, four men stationed at the corners pound down on the gate-sticks, thus rapping the pattern down as the cope is hoisted.

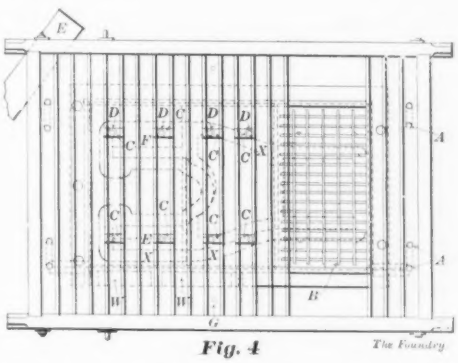


Fig. 4

In regard to anchors, it is not always necessary to have a pattern for them. Many a molder, if given a drawing, will with gate-cutter and trowel cut out a mold for an anchor good enough for the purpose. In making anchors do not have them come too close to the pattern. As the sand around them gets hot they expand, yet your casting is shrinking, so make allowance enough. We make some to within ¾ inch and some as near as ½ inch.

I have used the above to illustrate anchoring out the inside of patterns instead of making them in a flask and cheeking them off. In many cases it pays to take a pattern and make a core in the pattern at the deepest part that is to be lifted out. The core need not be very thick, and being fastened up to the cope, serves for an anchor to lift the sand. Especially is this useful in a deep, narrow pocket, which kind of pocket often scabs unless great care is taken for the vent to escape.

A casting of this kind, if made by a careful, painstaking molder, is quite sure to be a good job; but if made by one of the kind of molders that as long as a job will just pass "it's good enough," is pretty sure to have the under side looking like some parts of the country—humps and hollows, or hill and dale.—[R. H. Palmer, in American Machinist.

Strains in Hot Rolls.

Cast iron expands about .0000062 of its length for each increase of one degree Fahrenheit in its temperature. If a roll be 26-inch diameter at a given temperature, its diameter will increase by .01612-inch for every 100 degrees F. increase in the temperature. The circumference of a 26-inch roll is 81.68-inch and the change in the circumference for every 100 degrees temperature is .05064 inches, or about one-twentieth of an inch. These figures show what great strains may arise in rolls on account of differences in temperature in different parts of a roll which cannot be avoided entirely. It takes some time for heat to travel toward the central portions of the roll when it is being heated up, and it likewise takes time for the heat to travel outward when the roll is cooling. The temperature never remains absolutely constant there being a continued succession of minor changes, with occasional greater changes, so that there is always a difference of temperature. Taking a suppositious case of a roll where the surface to a small depth is 100 degrees cooler than the remainder of the roll, then this shell on the surface is distended by about one-twentieth of an inch, by the hotter inside portion. It is needless to say that such a tension would be very unsafe. Of course it could not happen that the temperature should change suddenly by 100 degrees as a greater depth in the roll is reached, yet there is no question that gradual changes of more than this amount sometimes occur.

If we consider the relative dimensions of the ordinary sheet or tin plate roll it will be noticed that the diameter of the neck is only slightly decreased from that of the body. As the bearing is ordinarily about the central part of the length of the neck, it is very apparent that a direct pressure against the central portions of the barrel of the roll, as occurs in rolling, could not possibly break the roll at the neck. The weakest point would be the central cross section of the roll. Yet it is a fact that rolls occasionally break at the neck. The failure cannot be attributed to anything but some internal strain which weakens the roll at this point. Here we have a different case, since the heating is not due to the steel being rolled, but to an unusual amount of friction between the neck and the brass, the extra

power consumed being converted into heat. The greatest care should be exercised in adjusting the brasses. The top roll should be set forward (toward the roller) about ⅛-inch as compared with the lower roll. The distance can be accurately shown by a plumb line used with relation to the center mark in the end, where the lathe center supported the roll in turning the neck, the body of the roll being in turn turned with respect to the neck, so that these marks indicate the true center of the roll with relation to the body. Especial attention should be paid to the side brasses of the bottom roll next the roller, since the pressure is greatest on these. This is caused by the torsional effect of the spindle, which is being exerted to turn the roll against the retarding influence of the piece of metal being rolled. It is as if the upper surface of the lower roll were held stationary, and an effort were made to turn the roll. This would tend to throw the roll towards the roller and this tendency is resisted by the side brasses nearest the roller, causing the greatest wear on these brasses.

Sometimes a roll breaks because it has been weakened by a crack which has occurred perhaps a long time before the break. It is very important in endeavoring to determine the cause of the break, to know whether it occurred all at once, under the conditions existing in the mill at the time, or whether at some previous time the roll had been subject to some wrong treatment. It may well happen that it took more abuse to make the crack than it did to break the roll finally, or it may even be that the final break occurred through no ill treatment at all. In such cases there is frequently a fruitful source of discussion as to who was responsible. A roller should not be blamed for breaking a roll which was cracked by a roller on some other turn. It is claimed that in all cases the question of whether there was a previous crack can be determined by wetting the end of the roll or exposing it to the weather for a few days, when the part that was cracked for some time will be found to rust much less rapidly than that which was broken fresh. The only explanation the writer has had of this phenomenon is that while the cracked roll is being used a thin coating of the magnetic oxide is formed because the roll is hot, and when the moisture is afterwards applied this layer of magnetic oxide tends to prevent the formation of the usual red oxide. If this be the true explanation, then it is evident the test should not be relied on too implicitly, since the element of time enters into the problem. A roll might be cracked, and shortly after, before there had been sufficient time for the magnetic oxide to form, the roll might be entirely broken. Then the test would not work satisfactorily, although it might be that the break occurred under entirely different conditions from those existing when the roll cracked. It is also possible for the roll to crack merely in the center, where there is no exposure to air and therefore no possibility of the formation of oxide. It is probable that cases of a roll cracking internally are much more common than is generally believed. So that while the test referred to may be taken as sure proof that there has been a crack, it cannot be relied upon to prove that there has not been a crack. —[Fer Blanc, in Tin and Terne.

Late Trade Publications.

The Chisholm & Moore Mfg. Co., of Cleveland, O., have issued an appendix to their catalogue covering chain hoists, pneumatic motors and cranes of many different types.

"The Manifest" is a small pamphlet sent out by the Dings Electro-Magnetic Separator Co., of Milwaukee, Wis., in favor of its widely-known separators.

A new catalogue has been published by the New York & Franklin Air Compressor Companies of New York, which illustrates and describes the latest types of New York-Franklin Air Compressors, designed for the operation of pneumatic tools and machinery in machine shops, boiler shops, shipyards, foundries and for every other service to which compressed air is applied.

The Adams Co., of Dubuque, Ia., are mailing a finely-illustrated catalogue of the Farwell Molding Machine to the trade. It shows the many different types of molding machines made by this company and some of the work turned out thereon.

"Graphite Productions" is a subject dealt with in a handsomely-illustrated catalogue issued by the Joseph Dixon Crucible Co., Jersey City, N. J.

J. Gilmour, Bennett Building, New York, is sending out a catalogue of foundry equipment handled by him, which includes the Newten cupola, foundry ladles, tumbling barrels, etc.

"Here and There in Our Shops" is the title of a neat pamphlet, describing some of the distinctive features of the Brown & Sharpe Mfg. Co., Providence, R. I.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

It keeps us hustling to fill the orders for these goods.

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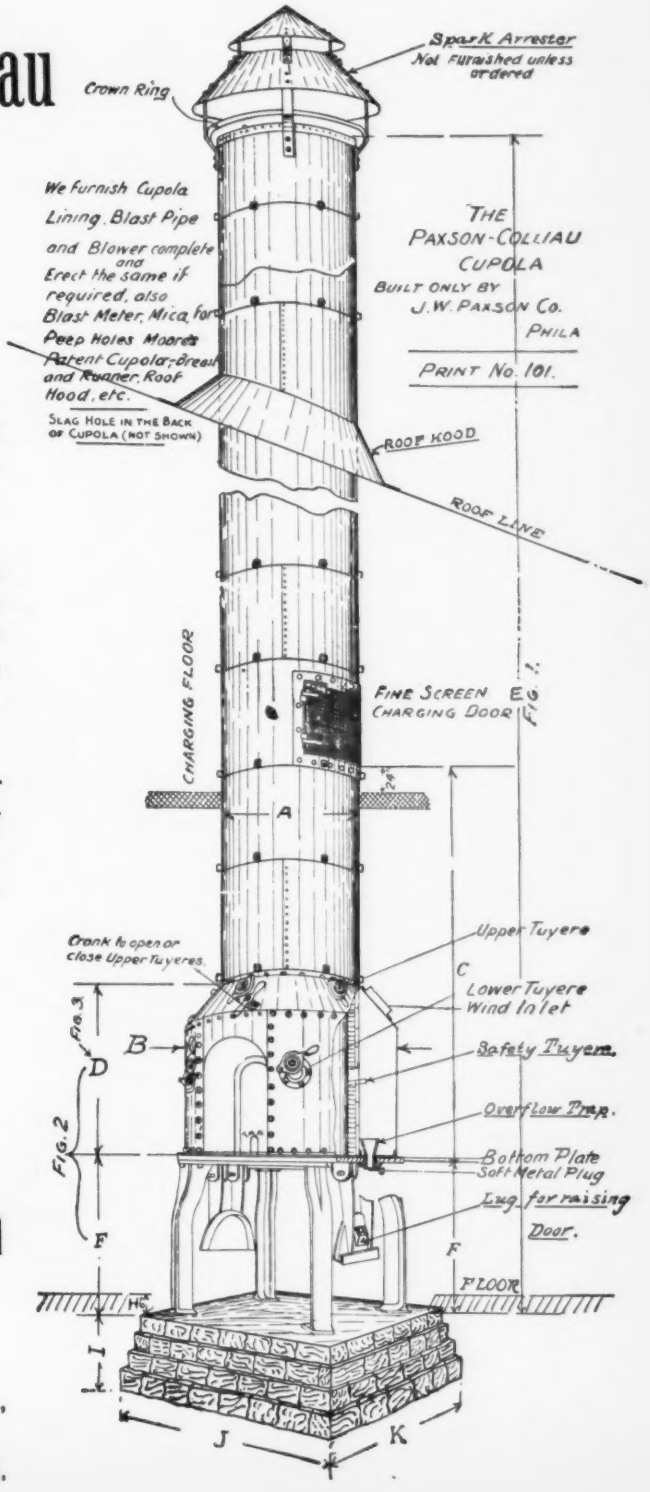

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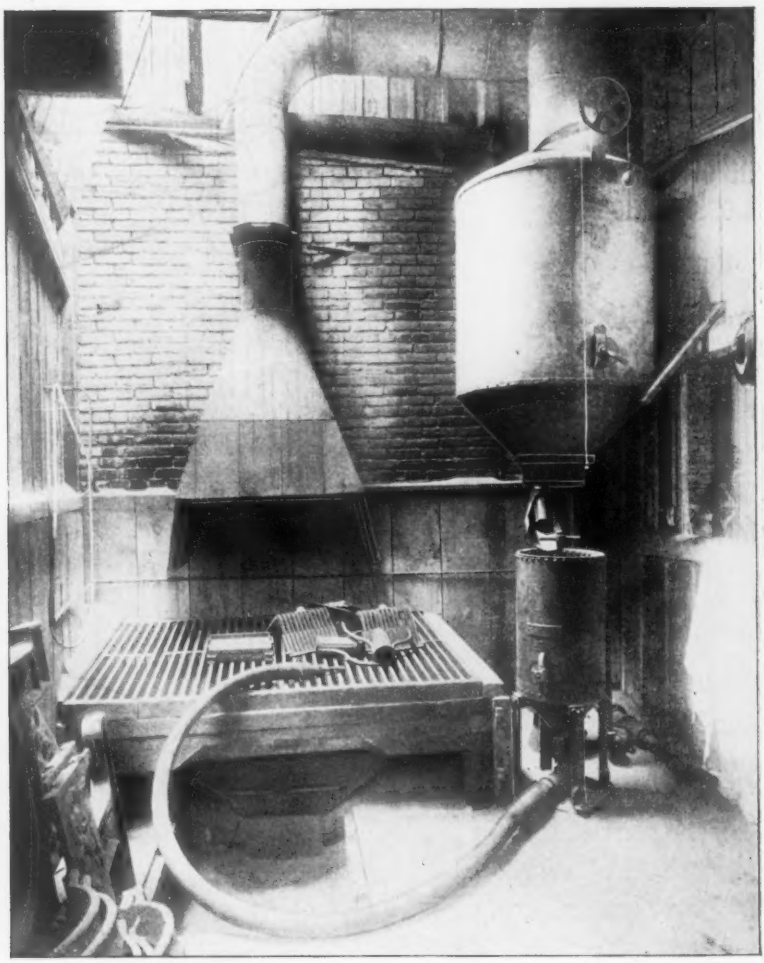
SAND BLAST

AND EXHAUST SYSTEM, AND SAND BLAST TUMBLING BARRELS.

PATENTED, OTHER PATENTS PENDING.



CUT SHOWS OPERATING ROOM OF MEDIUM SIZED PLANT.

MADE IN THREE SIZES. SEND FOR DESCRIPTIVE CIRCULAR.

APPARATUS BUILT TO MEET MODERN FOUNDRY REQUIREMENTS. A DEEP AND EXPENSIVE PIT IS NOT REQUIRED.

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FIRE SAND,
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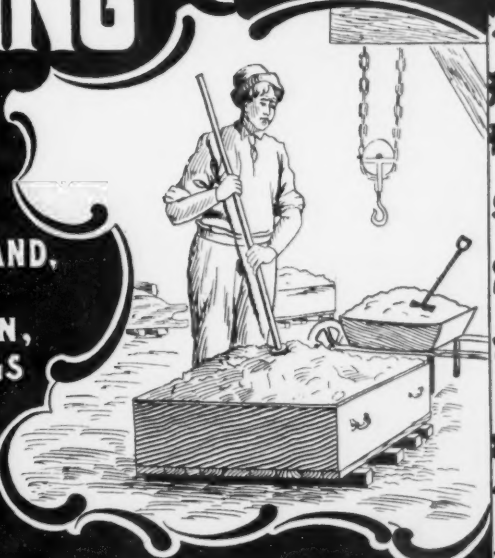
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.



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THE ATTAINMENT OF

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DIXON'S

For many heats.
For best conductivity.
For the least fuel.
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Have you ever read our treatise on crucibles. How made and how to use them. Copy free if you would like it.

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OUR COMMERCIAL TOURIST

REPRESENTING

The entire Ohio Valley product of MOLDING SAND Superior to any for wear and surface, and the largest body of Molding Sand under one control, together with 6,300 feet of railway siding, making an unlimited capacity.

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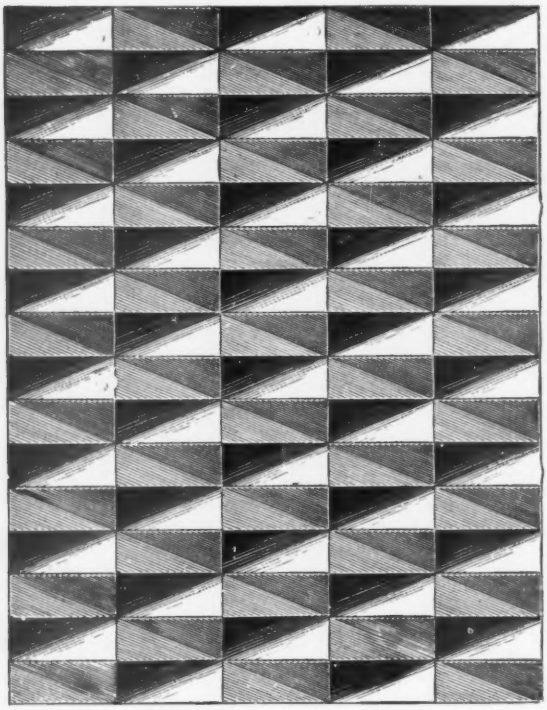
Molding Sand not equaled for Stove Plate, Hardware, Malleable or Grey Iron, light, medium, or heavy. Agricultural work, fine Brass and Core Sand, all of which are fully guaranteed as above.

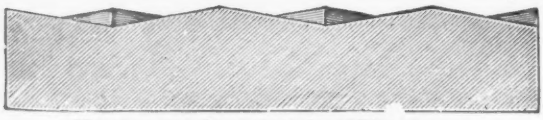
STANDARD MOLDING SAND

IN USE FOR FIFTY YEARS

OUR Specialties are: No. 5 and No. 6 Newport, fine; No. 5 Indiana, strong and fine; No. 2 Indiana, red floor sand, and New Albany, medium fine. Having absolute control of every variety we represent, being 15 distinct and superior sands, we can satisfy the most skeptical user.

The Newport Sand Bank Co., NEWPORT, KY.





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Diamond Pattern Lumber,

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This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide, and ½ inch thick. Send for sample.

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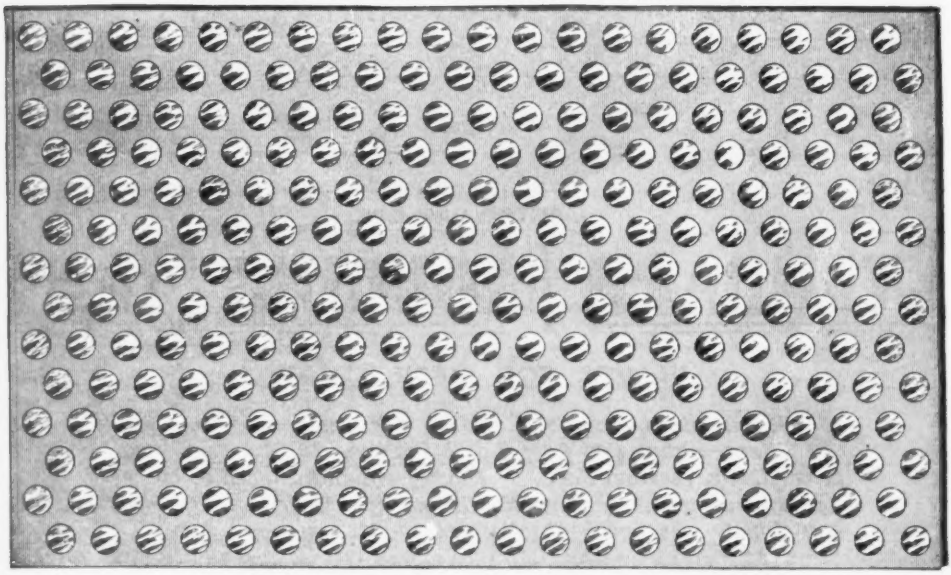

Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

BROWN BROS. MFG. CO.,

COXEY'S SILICA SAND

Is the only material it pays to use in steel molding. All leading manufacturers say so.

Coxey's Silica Sand is the only material it pays to use in making Cores for Iron, Brass or Steel Castings. Here is what a well known foundry foreman says:

THE C. & G. COOPER COMPANY,

CORLISS ENGINES, BOILERS, COMPLETE STEAM PLANTS.

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Referring to the Journal Block Core in a 60 in. Tangye Bed Casting, weighing 58,000 pounds, this was made from your sand with very satisfactory results. The comparative cost is as follows:

OLD SAND.		COXEY'S SAND.	
900 pounds, @ $1.75 per ton,	$0.78½	900 pounds, @ $3.30 per ton,	$1.48½
Labor in cleaning casting,	2.70	Labor in cleaning casting,	.94½
Total, -	$3.48½	Total, -	$2.43

Respectfully yours,
HARRY CHALLINGSWORTH,
Foundry Foreman.

This is a saving of a Dollar and Five Cents on one core, besides making a smoother casting and saving on tools in finishing.

Coxey's Silica Sand is the only material to use for bottoms of Open Hearth furnaces and Malleable furnaces. It outlasts all others.

I will be glad to quote you prices at your works.

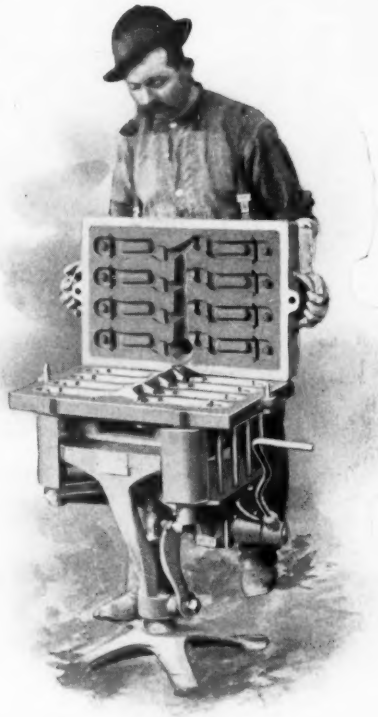
J. S. COXEY, MASSILLON, OHIO.

Twice as Many Castings

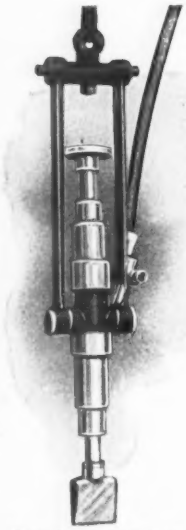
And sometimes more, can be obtained from one of our specially designed Molding :: Machines over hand work. It all depends upon the amount :: wanted, but where castings are required in reasonable quantities the . . .

Maywood Molding Machine

will pay for itself in a short time.



MAYWOOD MOLDING MACHINE.



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Where there is much Ramming to be done, the

Maywood Pneumatic Rammer

will relieve the molder of his hardest work, and leave him in better shape to pour off his floor.

Do not purchase infringing rammers and get into trouble. We are the exclusive licensees of patents covering this style of rammers.

Our system of fitting up patterns is the simplest and best, and entails the minimum outlay.

Write us for illustrated catalogue describing in detail our labor-saving appliances.

Maywood Foundry & Machine Co

MAYWOOD, - ILLINOIS

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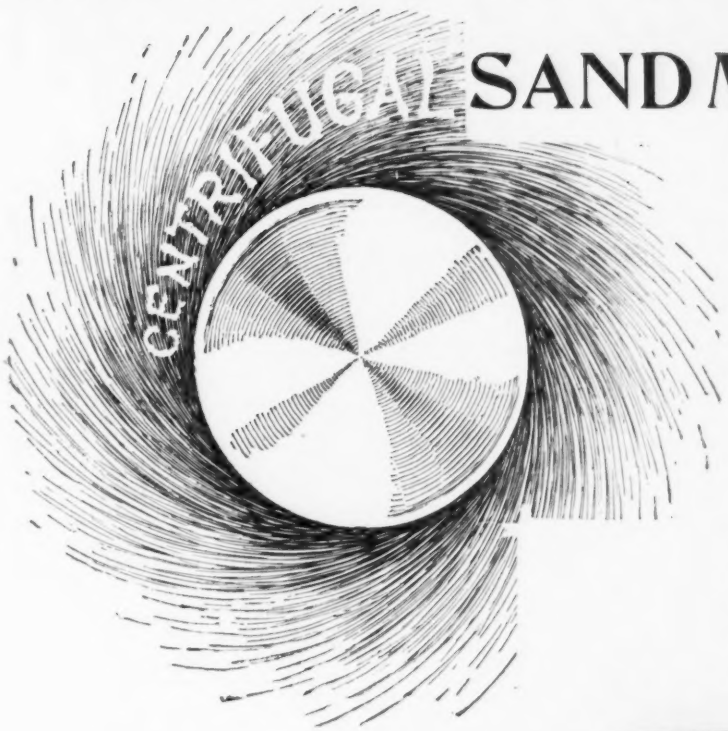

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Not an Experiment

PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand**, we have issued a small pamphlet which will be sent on application.

Among late Purchasers are:

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And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence Is Solicited.

Over 16,000 in Use.

ALWAYS READY!

800 TO 4,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

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PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to all Railroads and Contractors.

ROSS-MEEHAN FOUNDRY CO.
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GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
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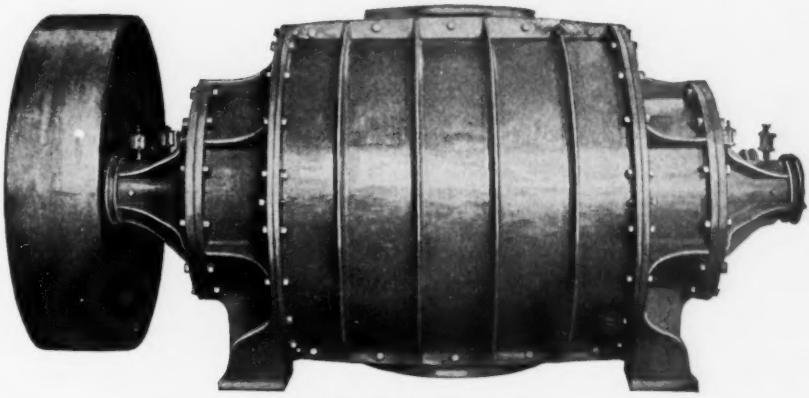

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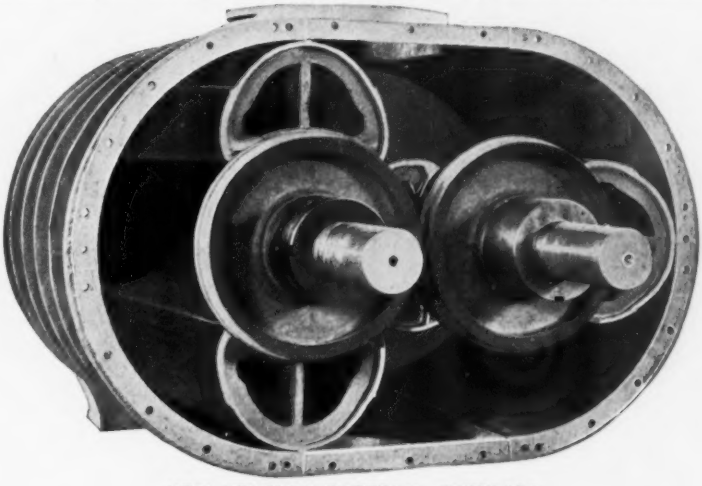
YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

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You Have Known Us for Years

FROM month to month we have been talking to you about our ***SMOOTH-ON CASTINGS,*** that wonderful compound which makes leaky castings steam tight and repairs defects of all the diversified kind to which the foundry is heir.

We have been asking you time and again to send for a small can and retain the good will of your customers. Will you do so to-day?

Our Chemical Laboratory.

In all our talk, we have said but little about our chemical laboratory. In order to carry out investigations in our own line we had to install the very best apparatus that money could buy. Finding that our own work does not require the full capacity of our laboratory we have decided to place its facilities at the service of foundrymen who recognize the value of chemical analyses in purchasing materials and regulating the quality of their output.

Chemical Analysis

is the only guide to the true composition of material. If you are in doubt as to the value of your raw material have it analyzed. We have a little booklet which tells the cost and shall be glad to send you a copy if you will ask for it.

SMOOTH-ON MFG. CO.,

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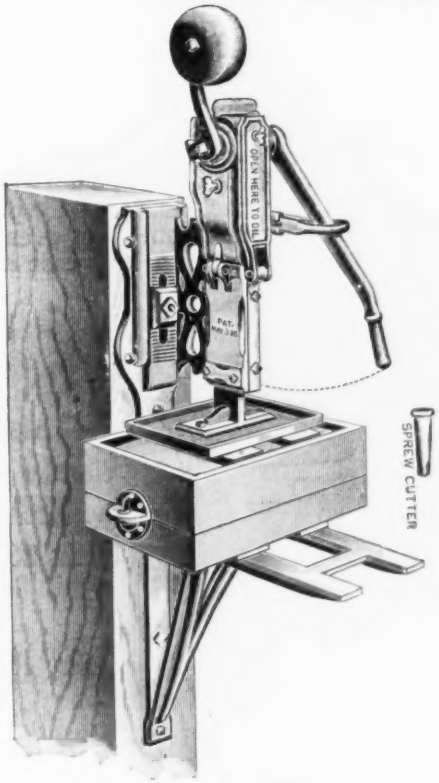
VREELAND TOMPKINS, CHEMIST AND MANAGER.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

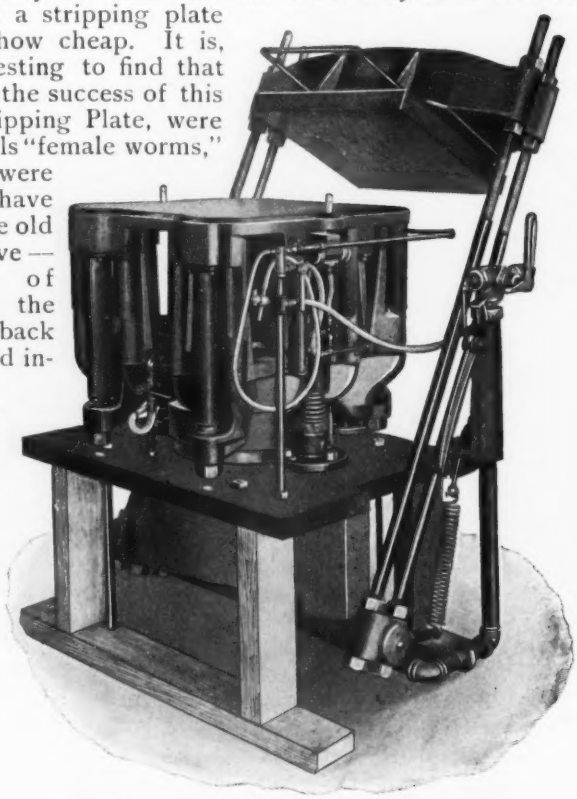
J. W. JACKMAN & CO.,
Sole European Representatives, London, S. W. Eng.

A Bit of Molding Machine History.

The first U. S. Patent for any kind of a Molding Machine was issued early in 1852 to a man named Satterlee, and it was quite a machine—seems to have been in appearance about half way between an eight day clock and a cider press—had "wheels"—of odd kinds, gear, sheave and sprocket, had pitman, levers, pawls, counterweights, chains and toggles—more gear than Kipling put into McAndrews Hymn.

All this mechanical uneasiness was to accomplish what the inventor called "the said work of sifting, filling and pressing."

Thus he omitted from the functions of a machine like a perfecting press and costing almost as much, the drawing of the patterns, the ONLY thing that some foundrymen are today buying $50 machines to do, on each of which they spend upwards of $1,000 for stripping plates and patterns. Satterlee was evidently ahead of his age in the U. S., for in England the very first idea of a molding machine, patented by one Maullin in 1800, was in effect nothing but a Stripping Plate—like some of our machines today—the $50 for machine, $1,000 for patterns kind. Maullin's machine molded screws (gimlet pointed too!), but even he in 1800 would probably have known better than to try to mold a lock case or a flat bevel gear with a stripping plate rig, no matter how cheap. It is, moreover, interesting to find that contributing to the success of this George 3rd Stripping Plate, were what Maullin calls "female worms," which, if they were not nuts, must have been limbs of the old tempter of Eve—which would of course carry the Stripping Plate back before Noah, and indicate that some of its family came through in the Ark.



This is a Vibrator Molding Machine for Flasks 26x26.

Has 12″ Draft and Power Ramming.

The Tabor Mfg. Co.

ELIZABETH, N. J.

Schuchardt & Schutte, Berlin, Germany. *James Hartley & Co., of Manchester, Ltd., Manchester, Eng.*

ROOTS'

BLOWERS

There are Brier ROOTS
Cube ROOTS
Square ROOTS

BUT ONLY ONE

P. H. & F. M. ROOTS

ALWAYS THE STANDARD.
OTHERS IMITATE, BUT NEVER EQUAL.

Forty years' experience boiled down to the most modern *Pressure Blower* in design and workmanship.

THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot.

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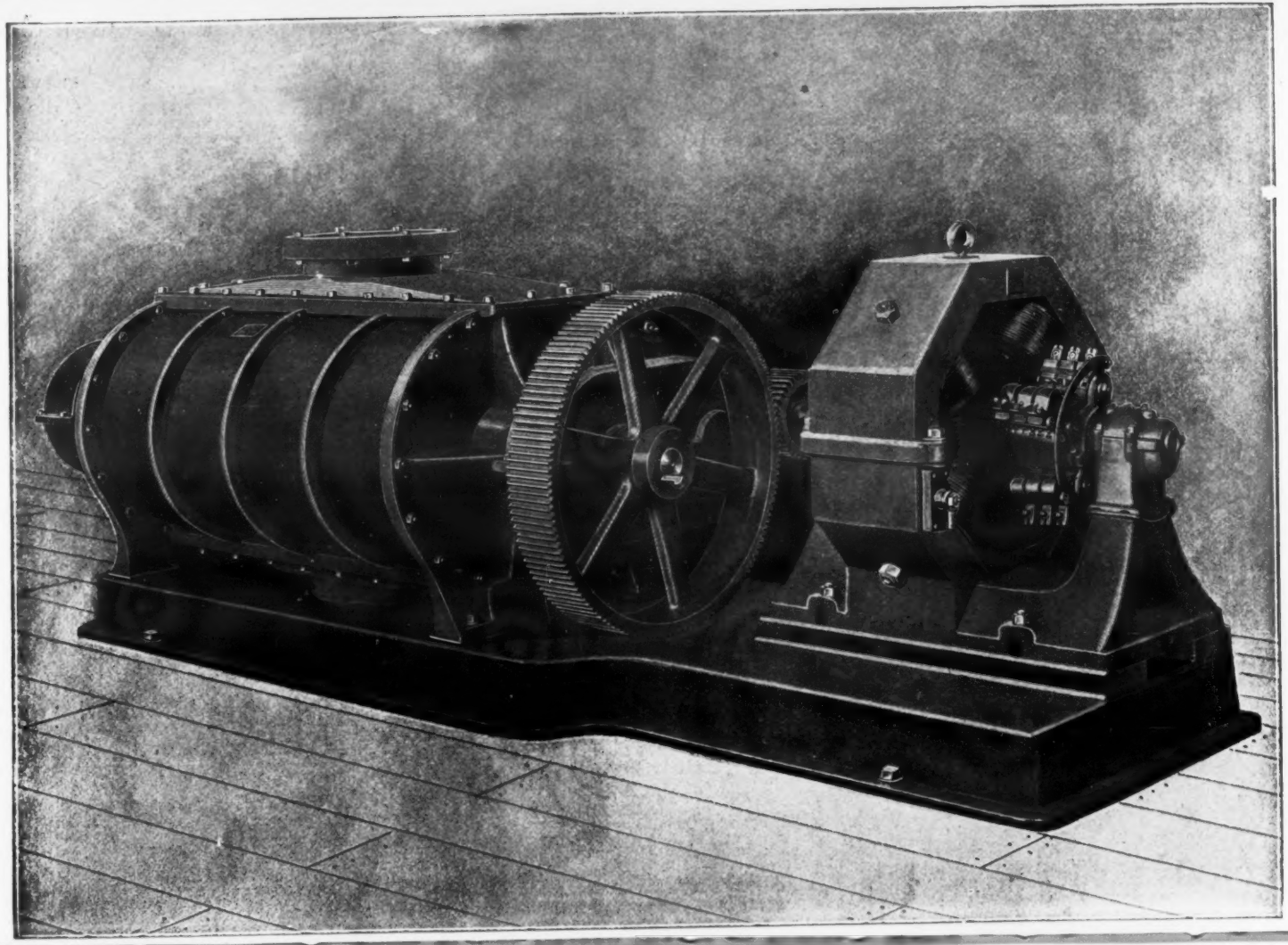
CHICAGO OFFICE:—1538 MARQUETTE BUILDING.

PITTSBURGH, PA.—F. R. Dravo & Co., 812 Lewis Block.



Once Used Never Forsaken!

IT is progressive foundrymen who purchase ***The Millett Core Oven.*** These people are not backward about saying just what they mean nor are they afraid to let others know just what they are using in the way of shop equipment. The National Sewing Machine Co., of Belvidere, Ill., operates a large foundry, requiring in its product perfect cores. Here is what they say about the ***Millett Core Oven:***

THE MILLETT CORE OVEN CO., BRIGHTWOOD, MASS.:

GENTLEMEN:—Referring to the Core Oven that we bought from you about three years ago, we desire to say that we have never purchased anything in the line of equipment for our foundry that has given us any better satisfaction than the Millett Core Oven. It is the finest oven for baking cores that we have ever seen, and it has never given us a particle of trouble since we set it up, and you are at liberty to refer to us at any time you may desire regarding the qualities of your oven, as we are willing to give it our endorsement, and you know if any concern once uses it they will always use it. Yours truly,

NATIONAL SEWING MACHINE CO.
B. Eldredge, Pres. and Treas.

Can we advance stronger arguments in favor of ***The Millett?*** Honest now, it will pay you to become acquainted with our Core Oven as soon as possible.

Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { ***THE S. OBERMAYER CO., Cincinnati and Chicago.*** / ***THE J. W. PAXSON CO., Philadelphia.***

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

FUEL AND ORE

The best of each, is what makes a first class pig iron. Whenever there is a boom in the iron trade "wildcat" furnaces flourish and the foundryman suffers. This is because a reliable and uniform supply of ores can not be obtained at a moment's notice. When the foundryman buys the first iron he comes to without investigating its quality he is liable to experience trouble. Good machinery castings have never been made from poor iron.

Cherry Valley Iron.

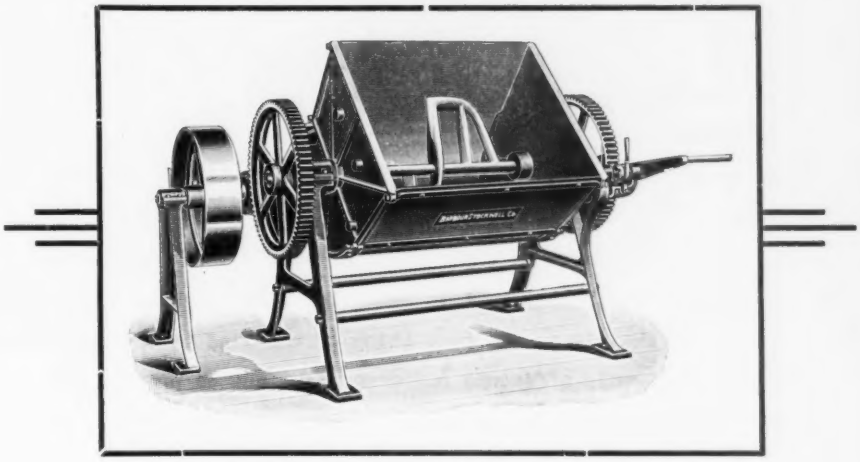
We have told you before of the care we take in selecting ores for **Cherry Valley Iron.** We have gone a step beyond other Foundry Iron Manufacturers and make our own coke. Thus we have complete control over the materials which make pig iron and do not have to go into the market and purchase by guesswork as other furnaces must do. If you want an iron that will machine easily and yet be strong, an iron that will permit your "tools to run fast" and satisfy your customers you will buy **"Cherry Valley"** brand. Better order now.

WE MAKE NOTHING BUT FOUNDRY IRONS.

The Cherry Valley Iron Co.

Murtland Building PITTSBURG, PA.

Boston Foundry Mixer



DRIVEN BY BELT OR BY MOTOR.

By its use you have a better mixed core-sand and facing at one-half the cost of that mixed by the old methods.

This Mixer is in use in many of the largest Foundries in the United States.

On Exhibition and For Sale by . . .

THE S. OBERMAYER COMPANY,

18th and Rockwell Streets, CHICAGO, ILL.

FOR PARTICULARS REGARDING OUR MIXER AND SAND SIFTERS, WRITE

BARBOUR-STOCKWELL CO.,

205 Broadway, CAMBRIDGEPORT, MASS.

PITTSBURG, PA.
Murtland Building

ALL AGREEMENTS ARE CONTINGENT UPON STRIKES AND OTHER DELAYS UNAVOIDABLE, OR BEYOND OUR CONTROL.

J. S. VAN CLEVE, Pres'y. JOHN R. McDONALD, Secy. & Treas. HENRY C. KELSEY. F. F. CLARK, Vice Pres't

ERIE FOUNDRY COMPANY,

MACHINERY CASTINGS.

PLEASE ADDRESS ALL COMMUNICATIONS TO THE COMPANY.

Erie, Pa. December 12th, 1900.

Messrs. Clarkson & Ford.,

224 & 226 Front Street,

New York.

Gentlemen:-

Please send us at once a bbl. of core oil on our contract. We are pleased to say that we have now given this oil a very thorough trial and find that it is the best thing of the kind that we have ever used. It is not only efficient but economical and we predict for you a large success with this oil.

Yours truly,

ERIE FOUNDRY COMPANY,

Pres't.

DIRECTIONS FOR USING

PERFECT CORE OIL.

FOR SMALL WORK.

You can use forty measures of sand, either quarts or gallons, to one part of oil; mix them well together and sieve, and if the sand is not tempered as well as a core maker desires it, he can add a little water, but we think that if it is mixed thoroughly no water will be needed.

In small cores you do not need wire.

FOR RADIATOR WORK.

For this you can use thirty-five parts of sand to one part of oil and do away with wiring. You can also use this oil with a mixture of part loam and sharp sand.

FOR LARGER CORES

such as engine cores and big work, use twenty to twenty-five parts of sand to one part of oil.

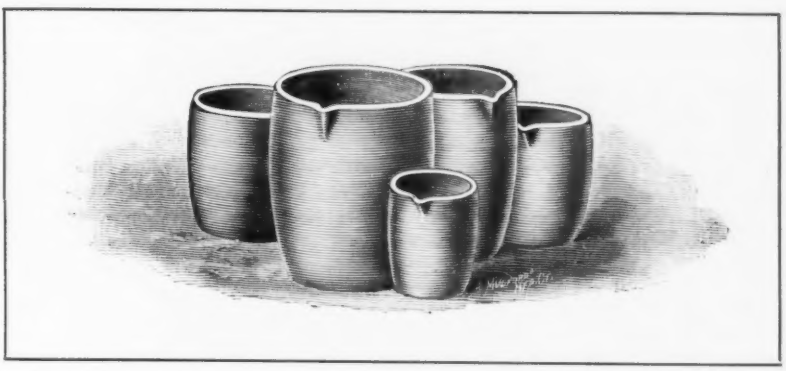
WRITE FOR BOOKLET AND PRICE TO

CLARKSON & FORD, *224 Front Street, NEW YORK CITY, U. S. A.*

BRIDGEPORT CRUCIBLE CO.

MANUFACTURERS OF

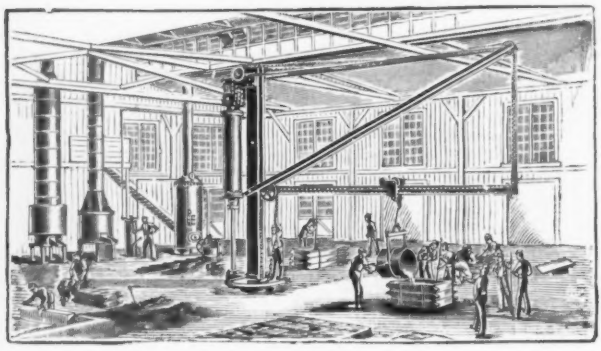
BLACK LEAD CRUCIBLES



CLIMAX FURNACE CLAY

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U. S. A.



5-Ton Steam Hydraulic Crane in a foundry.

"En Agin"

There's the Reading Iron Co., Reading, Penna. It's a slashin' big concern with its Blast Furnaces, Rolling Mills, Tube Mills, Steam Forge and the big Scott Foundry. Everybody through the East, at any rate, knows this establishment by reputation as one of the largest and best.

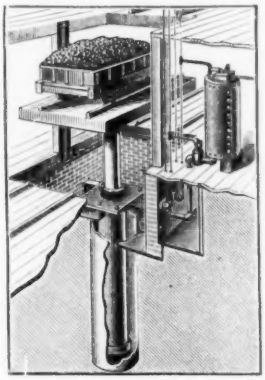
Well, they have used Ridgway Cranes for a long while, and as the writer pushes this pen we are making them some more out in the shop.

Of course, just a bare statement like that is not very impressive to you for there is nothing very startling in a concern buying a Crane or two. Certainly there isn't!

But when lots of readers of this "Ad" see this fact printed they will straighten up and exclaim, "What!"—and will read it over again.

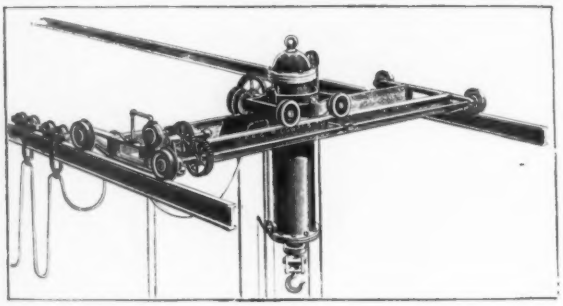
Why? Because the Reading Iron Co., in the Scott Foundry, have one of the biggest and best machine shops in the land and build lots of Cranes themselves for other people.

But when they want the very best of Cranes for their own works they come to Ridgway and get the Balanced Steam Hydraulic, which attaches right to the boiler—and makes them money.



Steam Hydraulic Cupola Hoist. Plunger Type.

Oil Governed Air Hoists



Just between you and us, — we think the largest single order for Air Hoists ever placed has been that just received from a bridge works for a lot of Ridway patent Hoists.

If you only knew the Ridgway Air Hoist, and knew the true inwardness of Air Hoist history and performance, you would have no other sort.

Why don't you get one and hang it up in your foundry or anywhere else and let it talk? It will tell you something. If it gets sassy, send it home.

"PLEASE TAKE THE ELEVATOR"

THIS PICTURE IS A "PUSH IT UP."

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT, CHAS. G. ECKSTEIN, 16 SPANDAUERSTR., BERLIN, GERMANY.

Let the Other Fellow Go Slow

You can not afford to do so. Every minute your workmen stand around waiting for things to be brought to them means a loss.

There is no doubt but that you do have a crane or two, great heavy affairs, never intended to be run up and down the shop delivering light loads. To be sure you need these machines for heavy work but that is no reason why you should wear them out handling light stuff.

There are a thousand little things brought in and out of your shop every day for which you need a trolley track; a real trolley track, **The Coburn.** It is quick acting and will put new life into your shop force. They will have to move to keep up with it and the result will show favorably in your profits.

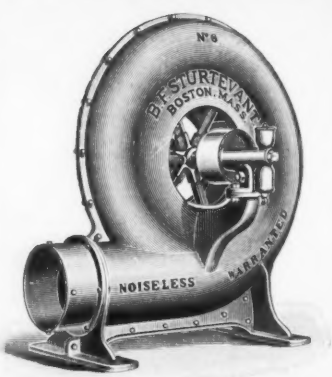
A trolley track is such a simple lasting affair, requiring no power equipment or other expensive adjuncts, that you can not afford to be without it. When you are buying one be sure you get the right kind, **The Coburn.** It is the acknowledged standard in all foundries.

Coburn Trolley Track Mfg. Co.,

HOLYOKE, MASS., U. S. A.

STURTEVANT
BLOWERS

of every conceivable form for every conceivable purpose. Built for endurance.



ALSO

Exhausters
Steam Fans
Electric Fans
Engines
Electric Motors
Generating Sets
Forges
Exhaust Heads
Steam Traps
Heating
Ventilating and
Drying Apparatus
Mechanical Draft

154

B.F. STURTEVANT Co. BOSTON,
NEW YORK · PHILADELPHIA · CHICAGO · LONDON

Directory of Leading Dealers in and Manufacturers of Fire Brick

FRESH SNOWBALLS

ALWAYS ON HAND.

The Kind That Do Not Melt.

Also, Cowen, T. Carr, M. T., and other brands of English Fire Brick,

Brown Baisley (Scotch Fire Brick,)
T. Carr, (English Fire Tiles).

S. R. CHURCH,

307 Sansome Street. San Francisco.

F. B. HOLMES & CO.,

Manufacturers and Shippers of

Works: Clarion Co. Pa. Jackson Co. Ohio.

FIRE BRICK

Brands: Steel Savage Mountain Holmes.

Best for Malleable Furnace and Cupola Work.

DETROIT, - - - MICH.

Established 1856.

HENRY MAURER & SON,

Manufacturers of

FIRE BRICK of All Shapes and Sizes.

Cupola Linings, Etc.

420 E. 23rd Street, NEW YORK.

Works—Maurer, N. J.

Presbrey Fire Brick Works

TAUNTON, MASS.

FIRE BRICK for All Purposes.

Extra quality Fire Brick suitable for Iron Trade. Largest Stock in the State, all Shapes and Sizes.

Kiln Brick, Cupola and Furnace Blocks a Specialty.

Finest Quality Fire Mortar and Crude Clay. Shipments promptly anywhere. Send blue prints for our prices on Special Work.

STATEN ISLAND CLAY CO.,

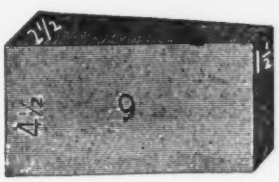
WOODBRIDGE, N. J.

"Royal Star" and "Scioto Star"

High grade FIRE BRICK.

Best for Rolling Mills, Blast Furnaces, Foundries, etc. "Try our Cupola Blocks and Scioto Ground Clay."

The Scioto STAR Fire Brick Works,



PORTSMOUTH, OHIO.

Send for Catalogue.

Established 1871.

Incorporated 1876.

Telephone, Canal 267.

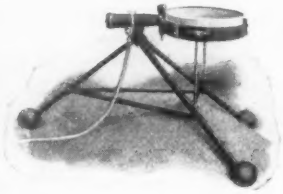
FIRE BRICK and MOLDING SAND.

All Grades and Shapes of Fire Brick and Cupola Block.

H. S. VROOMAN,

220 West Twentieth Street.

CHICAGO.



ELMER E. HANNA

751 CULLOM AVENUE,
STATION X. CHICAGO, ILL.

PORTABLE, PNEUMATIC

SCREEN SHAKERS.

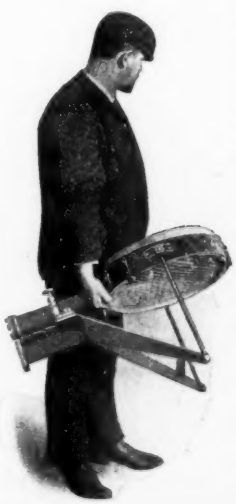
Let me tell you something about the Hanna Portable Pneumatic Screen Shaker.

In the first place it was designed not for the market, but to meet our own needs in our own foundry. Our friends saw it there, saw the marked advantages derived from it, and wanted it. Then more friends wanted it, and we saw that there was a place for it in every foundry in the land.

We made the necessary arrangements for its ***manufacture,*** so that we could sell it at a reasonable price. Those that we had ***made*** for our friends cost us all that we dared to charge and keep our friends. Now we are anxious to be the friend of every foundryman in the country, and supply the new friends with screen shakers, as we have the old.

What is it? Simply a valveless piston air motor attached direct to a screen holder, which it vibrates.

Screen holder takes the ***ordinary 16-inch round foundry riddle.*** Riddles can be changed in a ***fraction of a minute.***



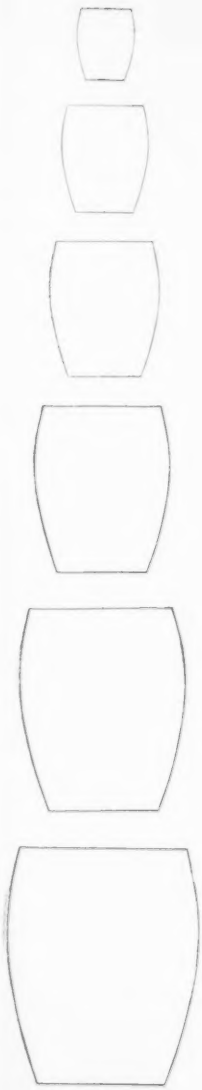
Portability. The Tripod machine weighs 100 pounds, and the Post machine 50 pounds. ***One*** man handles it.

Capacity. With one-half inch mesh screen, all that two men will shovel, and with one-fourth inch mesh screen, enough for one man to shovel. Other sizes in proportion.

Cost of Operation. About 20 cubic feet free air per minute, or, at the usual cost of compressed air to 80 pound gauge, about 5 cents per hour.

Your order will have prompt and careful attention.

McCullough-Dalzell Company



CRUCIBLES

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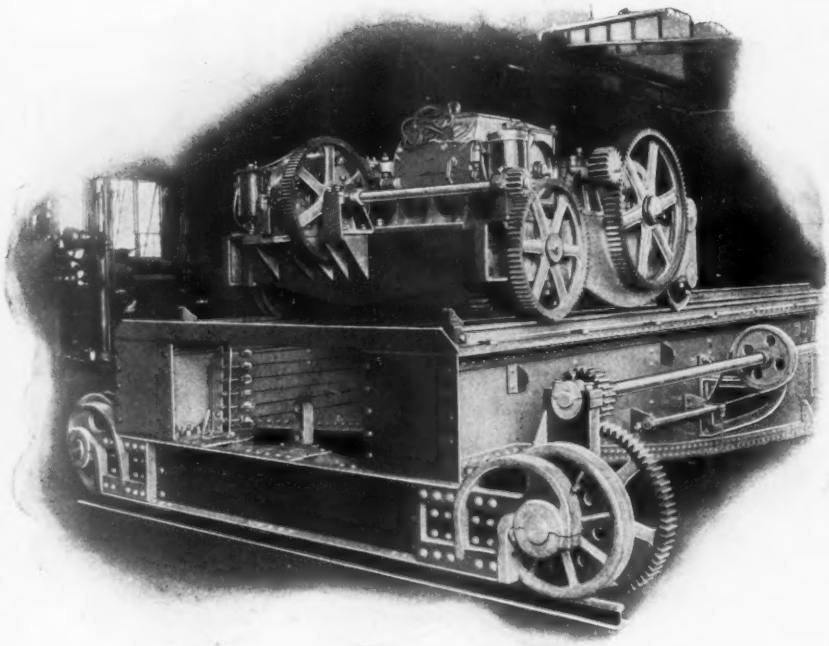
McCullough-Dalzell Company

PITTSBURGH, PA.



30 TON ELECTRIC TRAVELING CRANE.
View shows the construction of our improved "Underbody" truck, furnished only with "Whiting Cranes."

CRANES FOR ALL PURPOSES

ELECTRIC, AIR AND HAND. ALL STYLES.

AIR HOISTS VERTICAL AND HORIZONTAL TYPES.

Elevators for Foundries, operated by Electric, Compressed Air or Belt Power.

The Whiting Cupola

WELL CONSTRUCTED, GOOD RESULTS, 750 IN SERVICE. THE BEST ON THE MARKET.

Engineers and Designers of Complete Foundry Plants.

CATALOGS 18, 20, 21 FREE ON APPLICATION.

WHITING FOUNDRY EQUIPMENT CO.

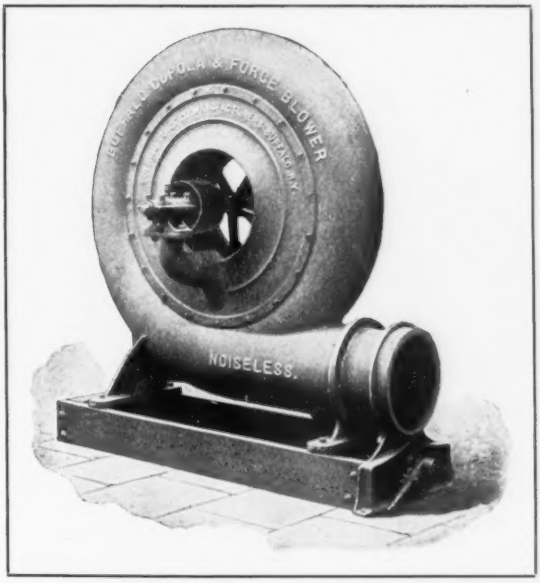
GENERAL OFFICE AND WORKS;
LATHROP AVENUE, **HARVEY, ILL., U. S. A.** (CHICAGO SUBURB.)
CHICAGO OFFICE: 1543 MARQUETTE BUILDING.

Successful Foundrymen for Satisfactory Melting

EMPLOY

Buffalo Cupola Blowers

Varying Sizes, Steam, Electric, Pulley;
For all High Pressure Blast Service.



BUFFALO STEEL PRESSURE BLOWER
on adjustable bed.

Buffalo Steel Plate Tumbling Barrel Exhausters

render the air of casting cleaning rooms endurable.

Buffalo Forge Company,

BUFFALO, N. Y.

NEW YORK. CHICAGO.

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Three Motor Electric Traveling Crane, Type No. 105.

CRANES.

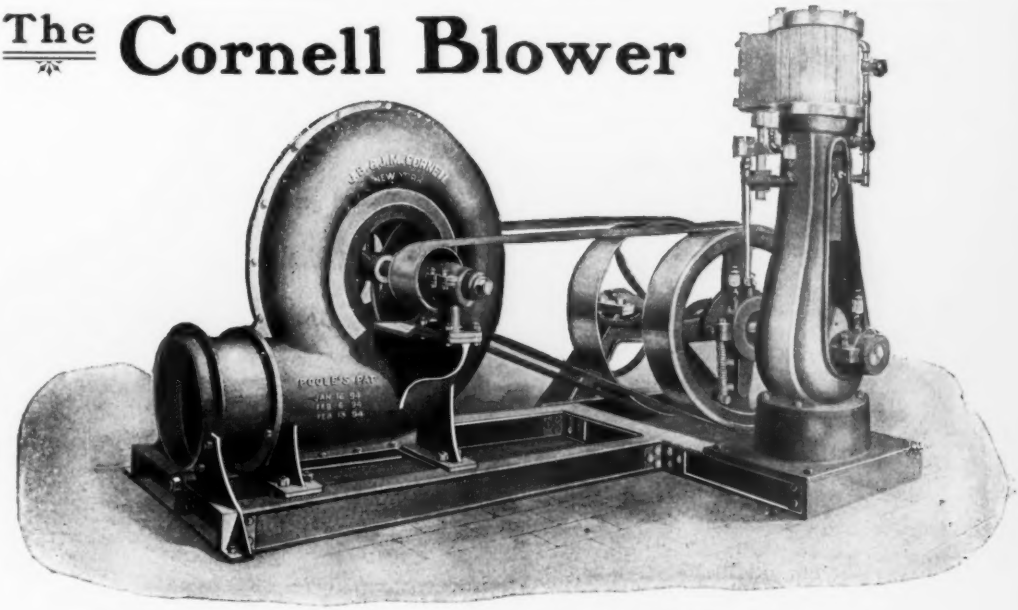
ELECTRIC, PNEUMATIC, STEAM AND HAND POWER, TRAVELING, JIB, PILLAR, GANTRY AND LOCOMOTIVE CRANES. AIR HOISTS. :: :: :: ::

NEW DESIGNS. HIGH GRADE WORK.

Let us tell you about them.

NORTHERN ENGINEERING WORKS, 4 CHENE STREET, DETROIT, MICH.

The Cornell Blower



WILL SUPPLY YOUR CUPOLA WITH AIR AT LESS COST THAN ANY OTHER MACHINE. THIS IS SAID BY THOSE WHO KNOW.

J. B. & J. M. CORNELL, 26th Street and 11th Avenue, NEW YORK CITY.

Undisplayed Advertisements.

Rate thirty cents per line each insertion. Answers addressed to our care will be forwarded.

WANTED—Molders familiar with plate work. Address "PLATE WORK," Box 494, care THE FOUNDRY, Cleveland, Ohio.

WANTED—One second-hand column lathe suitable for facing 18 in. to 20 in. Address "LATHE," Box 491, care THE FOUNDRY, Cleveland, Ohio.

FOR SALE—Patent for core machine to make pipe or column cores. Address "CORE MACHINE," Box 497, care THE FOUNDRY, Cleveland, Ohio.

FOR SALE or rent. Foundry and machine shop in good locality. Also a good set of No. 8 wood stove patterns. Address FRANK MEGOW, Independence, Iowa.

WANTED.—A number of experienced and competent molders for large work. Apply by letter. THE WESTINGHOUSE MACHINE COMPANY, East Pittsburg, Pa.

FOREMAN pattern maker desires a change. Sober, reliable and competent. Age 34. Good references. Address "PATTERN MAKER," Box 487, care THE FOUNDRY, Cleveland, Ohio.

WANTED—Foreman to take charge of foundry, making rail bonds a specialty. Give references and age. Address "RAIL BOND," Box 493, care THE FOUNDRY, Cleveland, Ohio.

FOR SALE—Chicago foundry business with tools, patterns, flasks, etc.; established 15 years, railroad specialties, good paying business. For particulars address P. O. Box 636, Chicago, Ill.

WANTED.—First-class foreman, for iron foundry, experienced on valves and fittings. State age and wages expected. Address "VALVE," Box 477, care THE FOUNDRY, Cleveland, Ohio.

WANTED.—First-class foreman in brass foundry employing ten to fifteen molders; one familiar with brass faucet work. Address, stating age and references, DRAWER A, New Britain, Conn.

WANTED—Situation as superintendent of brass and light gray iron foundry; 20 years' experience in different shops. Best of references. Address J. M. HECHT, 312 N. Park Ave., Austin Station, Chicago, Ill.

ROOT BLOWERS, Nos. ½, 1, 2, 3, 5, 6 and 7. STURT BLOWERS, Nos. 2, 3, 4, 5, 6, 7 and 9. Cupolas, Colliau 2 tons, Whiting 6 tons, nearly new. A. ASHER, 2d floor, 109 Liberty St., New York.

WANTED—First-class, up-to-date jobbing molder; must be good on loose and ornamental work. Steady job for good man. No others need apply. Address THREE RIVERS BRASS WORKS, Three Rivers, Mich.

WANTED—To correspond with some good stove manufacturing house, who desires the services of a practical and experienced superintendent. Address "OVERSEER," Box 488, care THE FOUNDRY, Cleveland, Ohio.

CHEMIST WANTED—One accustomed to analyze steel as well as gray iron castings. Only those who have had practical experience will be considered. Address "CHEMIST," Box 490, care THE FOUNDRY, Cleveland, Ohio.

WANTED—A working foreman for a brass foundry in Western New York, employing four men. Wages $3.50 to $4.00, according to ability. Give references and experience. Address "METALS," Box 496, care of THE FOUNDRY, Cleveland, Ohio.

WANTED—Foreman who has had experience in molding commutator bars to take charge of our foundry. Permanent position to right man. Give references and age. Address "COMMUTATOR," Box 495, care THE FOUNDRY, Cleveland, Ohio.

FIRST CLASS WAGES.

Will be paid first-class brass molders to go to a western city. Must have been accustomed to car bearings and heavy work. Address "BRASS MOLDER," Box 492, care THE FOUNDRY, Cleveland, Ohio.

WANTED—A bright hustling young man to visit the malleable trade, one who is familiar with the railroad and implement trade and competent to make prices and figure on work. Address "MALLEABLE," Box 1347, care THE FOUNDRY, Cleveland, Ohio.

POSITION WANTED—As superintendent of malleable iron works. Understands the business in all its departments. Can erect plant up to date; 20 years' experience; can furnish good reference. Address "AIR FURNACE," Box 489, care THE FOUNDRY, Cleveland, Ohio.

SITUATION WANTED—As superintendent chief or consulting engineer with progressive concern; technical education; 11 years' practical experience; expert on melting and mixing, and successful experience in managament of help, mechanical and chemical work, estimating, etc. Address "AI ENGINEER," Box 486, care THE FOUNDRY, Cleveland, Ohio.

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Roots second-hand, bought, sold or exchanged. All my blowers are overhauled by expert blower machinists. I do not advertise a "fake" list of blowers not in my possession; my stock is constantly changing. Write for particulars and prices.

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Ground Floor, 109 Liberty St., New York City.

The best way to get rid of any little thing about your shop, for which you have no further use, is to insert a few lines describing it on this page.

This is the common meeting ground for buyers and sellers of foundry equipment.

Thirty cents a line is all it costs to tell your story.

THE *Stearns*

MOLDING MACHINE

Patented September 25, 1900.

Will do the most work in the shortest time with the least fatigue to the operator.

THE PERFECTION OF MOLDING MACHINES.

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This man is using our Pneumatic Hand Rammer, and though doing more work in one hour than he has ever done before, he is doing it with one-fourth the effort, for he merely has to guide the Rammer over the work. This is a fine thing for him; but the main advantage is to his employer —for the Rammer does five men's work.

Our Pneumatic Hand Rammer strikes 250 to 300 blows a minute. The speed and force are entirely controlled by the operator.

Send for Catalogue of our Pneumatic Tools, Chipping and Riveting Hammers, Piston Drills, Rotary Drills, Rammers, etc.

Philadelphia Pneumatic Tool Company,

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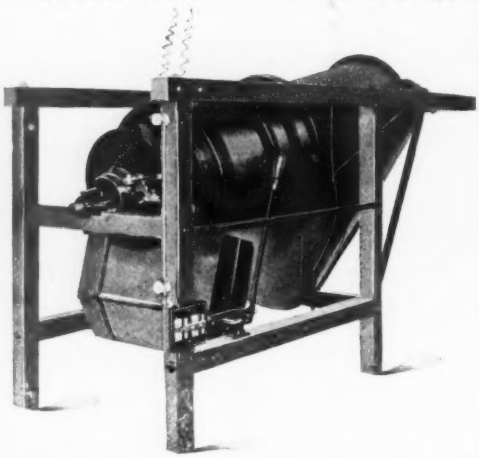

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Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months.

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MOLINE PUMP COMPANY.

MOLINE, Ill., Sept. 17th, 1900.

Barnard & Leas Mfg. Co., Moline, Ill.

Gentlemen:—In accordance with our contract, that in case you could show on test of your Magnetic Separator, that it would net us fully 25% each year on the investment price of $300, that we would order one, we hereby enclose order for one Magnetic Separator and have to report as follows as to result of test:

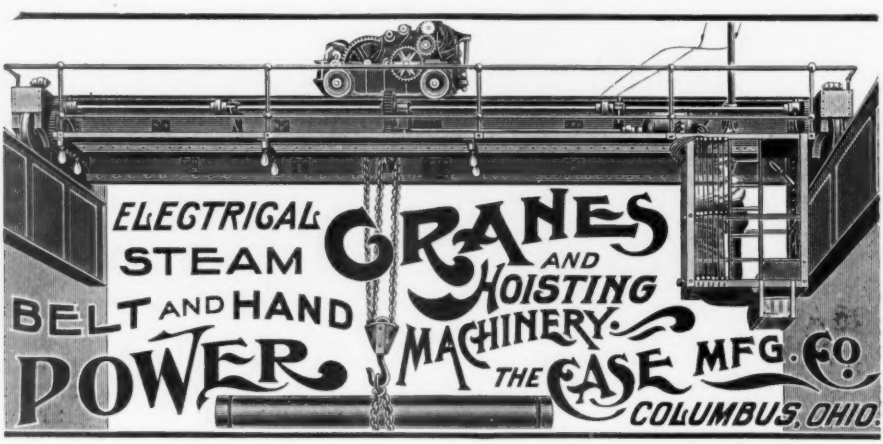
We saved up the waste from our foundry and cupola for five heats (we melting every other day or three times a week and averaging some 5,000 lbs. of iron each heat.) This waste saved from the five heats weighed 8350 lbs., and on running it through your machine it separated and saved 1201 lbs. of iron.

On this showing we calculate the machine ought to net us after deducting all expenses of operating same, at least 35% each year on the cost price of $300 We consider this a strong test of the machine, as we had our cupola and other waste well picked over by hand before putting it aside for the trial test, and furthermore before the test was made we fully believed that our waste of iron was so small that it would not warrant us to buy one of your machines at any price. Very truly yours, MOLINE PUMP COMPANY,

E. H. SLEIGHT, Prest. & Treas.

Give this machine a trial The saving will surprise you. Write for prices and discounts.

Barnard & Leas Mfg. Co., ***Mill Builders and Mill Furnishers, MOLINE, ILL.***



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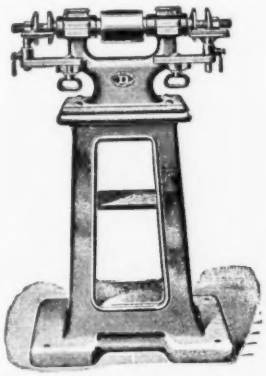

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For removing Scale from Iron and Steel Plates, Bars, Forgings, etc., also Cleaning Iron, Steel and Brass Castings

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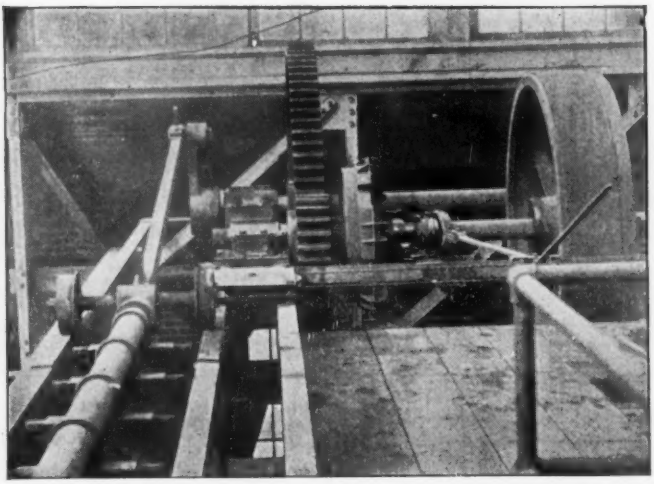

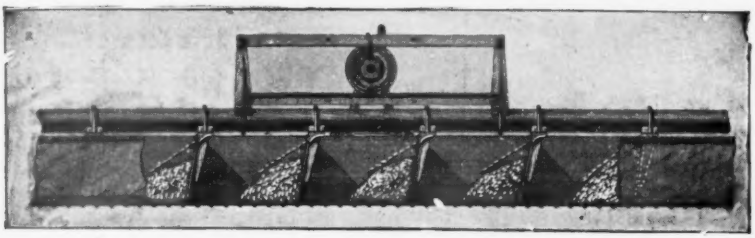

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is used in making brass and bronze castings; it makes a superior metal, sounder castings, more homogeneous in structure, richer color, better wearing metal, of higher surface lustre than alloy made with imported tin. U. S. TIN is to be used in same proportions as imported tin.

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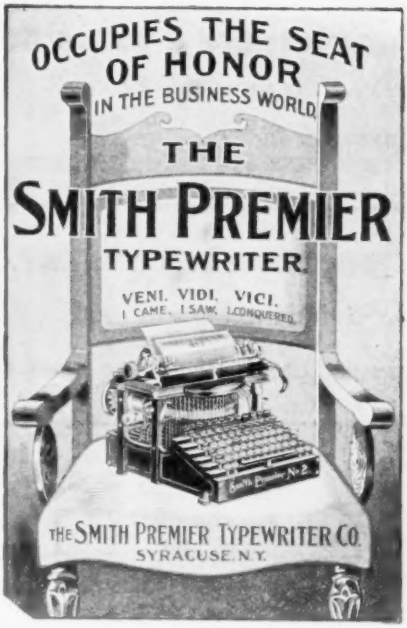

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Take the tool to the work and save heavy handling.

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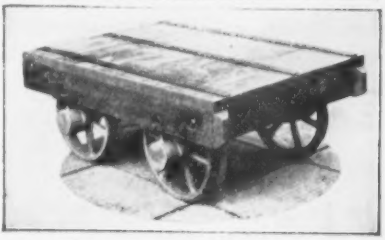

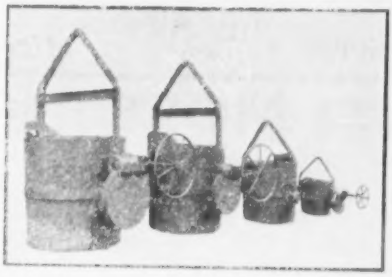

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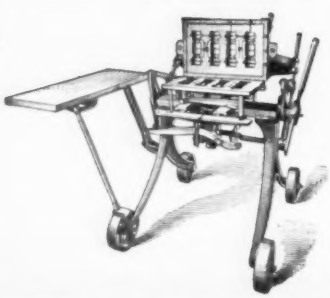

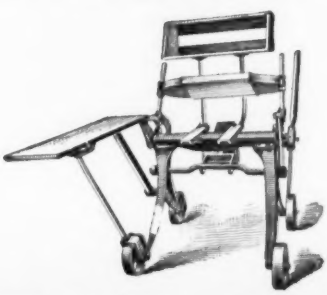

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An energetic and capable foreman will find in this an opportunity to make a competence for himself. Those now chiefly interested in the business desire to remain with it, the object here being to permanently obtain the interested services of a capable foreman.

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It shows how we prepare young men and women to earn good salaries in positions that require special knowledge. It tells how you can obtain a salaried position in your chosen profession, trade or business, and support yourself while learning how to earn more. You can become a

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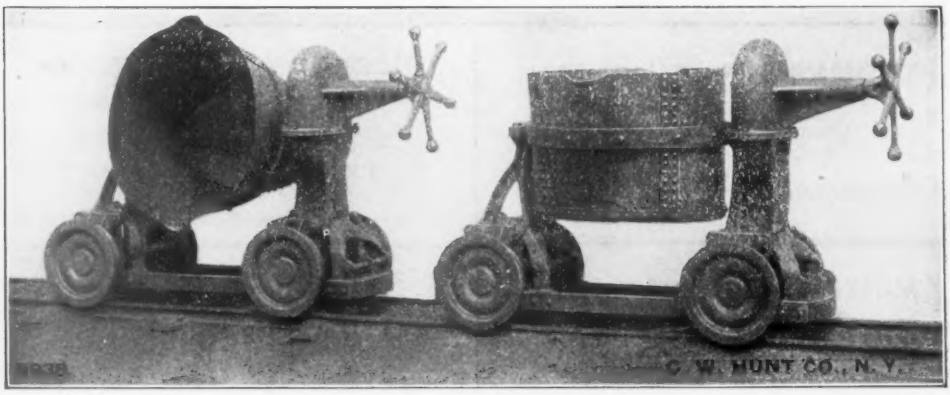

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Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 36 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle, is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

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When you master these then take another degree by studying ***Metallurgy of Cast Iron*** (***$3.00***), and ***The Cupola Furnace*** (***$3.50***). All about the melting of iron and the operation of cupolas.

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OF ALL KINDS

MANUFACTURED BY

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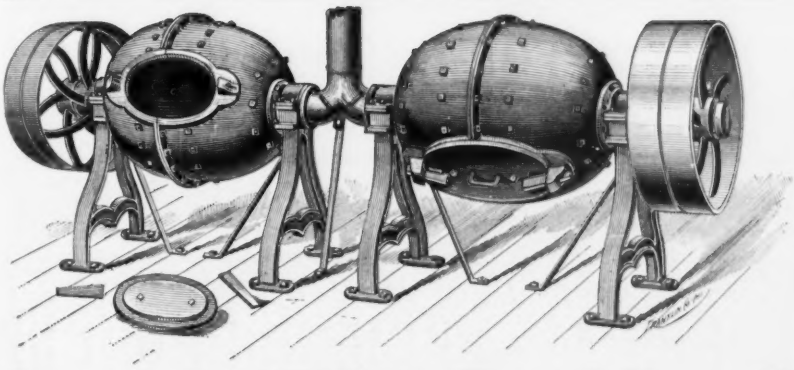

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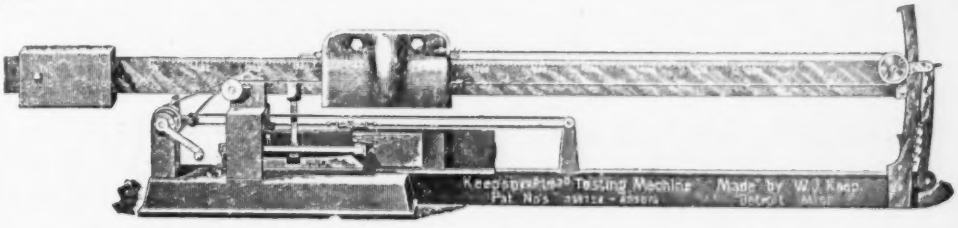

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Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture

DEAL WITH THE MANUFACTURER DIRECT.

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ON ITS GOOD BEHAVIOR
If you say it's all right
YOU PAY FOR IT
otherwise we lose.

When you consider the possible number of foundries that may accept this offer, you will realize that we could not afford to make it unless we had, from experience, knowledge of the value of

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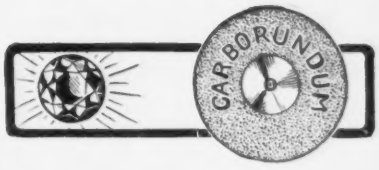

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Carborundum is the hardest substance on earth—
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Means chaplets that are made right. No blowing or blubbering when the mold is poured. No plugging to hide defects.

We make chaplets for all classes of castings, special chaplets when required. If you tell us just what you need we will see you get it.

We have a few catalogues left.

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Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

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The business has been established since 1868 and is in a paying condition.

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FOUNDRY AND MACHINE SHOP,
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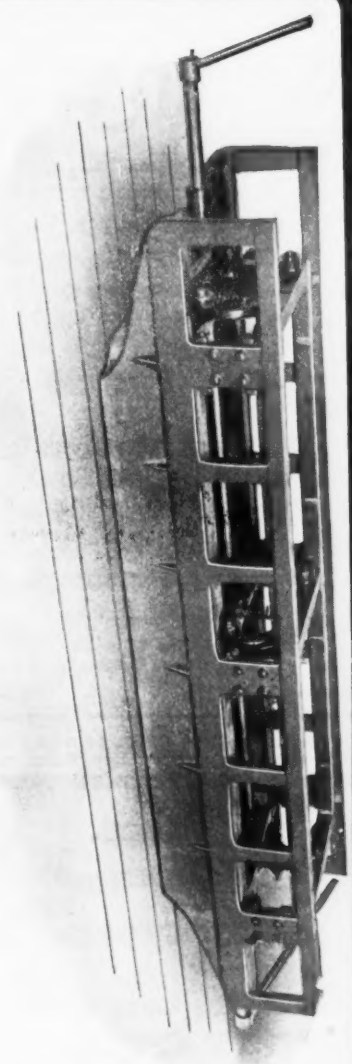
We will make your patterns quickly and at low cost. We have a number of customers for whom we make more than one thousand dollars' ($1,000.00) worth of patterns each month. We have made eighteen thousand dollars' ($18,000.00) worth for one corporation inside of ninety days.



24 IN. BY 9 FT., DOUBLE SHAFT, 6 CRANK, 6 WAY MACHINE.

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Molding Machines

MANUFACTURED BY

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are not complete pattern shop equipments.

No pattern shop is complete, however, without them, and if you can have but one machine in your shop, you cannot find one that will earn you more.

But you cannot afford to get along with only an OLIVER WOOD TRIMMER any more than you can afford to get along without *any* OLIVER WOOD TRIMMERS.

If you are making patterns you require pattern shop machinery—not one machine but an equipment of up-to-date machines. Some shops require more than others of course.

We can fit you out with most anything you will require.

We did not build a Band Saw and then see how it would work in pattern shops. We studied the requirements for Band Saws in pattern shops first, for seventeen years, and it is no wonder that the OLIVER BAND SAW is the best for pattern work.

It is the same on other machines. Let us tell you more about them.

American Machinery Co.

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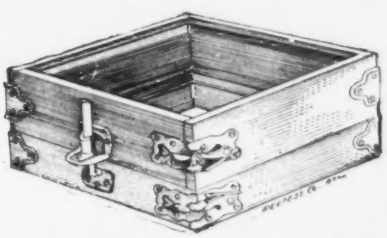

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This price is only for those sizes we now have on hand. Parties desiring flasks should take advantage of this offer as this ad will not appear again. Write us for sizes in stock.

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Swarts Metal Refining Co.

SMELTERS AND REFINERS

WE are supplying brass foundries throughout the country with our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We also carry a stock of the best makes of Crucibles at the lowest prices.

Try a small barrel of our Iron Flux at seven (7) cts. per lb. for the purifying and removing of Iron in the making of Brass Castings.

We also supply brass foundries with Scrap Metals of all kinds, at the lowest market prices, put up in crucible shape, if so desired.

Main Office and Works, 18-20 N. Desplaines St.,

ESTABLISHED 1885
INCORPORATED 1895

CHICAGO, ILL.

CORRESPONDENCE SOLICITED.

COKE

"ALEXANDRIA," High Grade, Low Sulphur, FURNACE and FOUNDRY COKE.

Made exclusively form washed coal. Special care taken in grading and selecting for **FOUNDRY** use.

HIGHEST QUALITY. **LOWEST PRICES.**

SATISFACTION GUARANTEED.

WRITE

Goff, Horner & Co.

PIG IRON, STEEL, COAL and COKE

308-309-310 Lewis Building, PITTSBURG, PA.

Every Foundry has a Blacksmith

EVERY BLACKSMITH NEEDS A GOOD BLOW.

ALL KINDS AND SIZES OF BLOWERS.

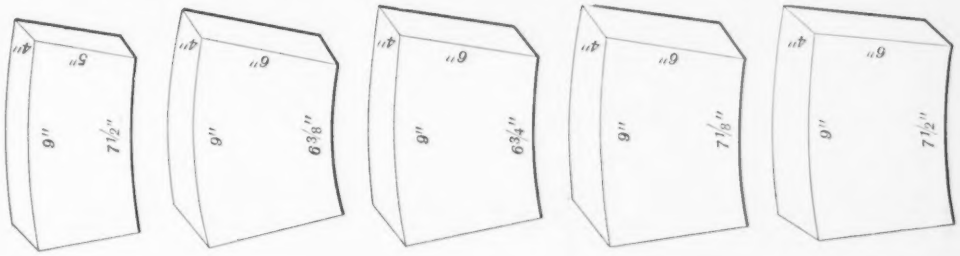
J. S. McCORMICK COMPANY,

Foundry Supply House

PITTSBURG, PA.

"Franklin Crown" and "Sligo"

MAKE THE BEST BLAST FURNACE LININGS ON EARTH.



If that is true then they must be excellent for Cupolas, Boilers, etc. We make every conceivable shape in **Fire Brick.** Our **Fire Clay** is used almost exclusively by the large Steel Companies in the west. Send us a trial order, you'll never regret it.

The Garden City Sand Co. 3 TELS. ALL M 4827. 188 Madison Street, CHICAGO.

Mannie Special Pig Iron

Visitors to the Hartz Mountains, in Germany, invariably bring back with them ornamental castings which are made direct from the furnace. These castings represent various kinds of art work, including helmets, shields, jewelry caskets, etc. They are very dense, free from pin holes or the slightest imperfections. We believe that nothing in the way of finished metal that has ever been produced across the water, cannot be reproduced here, and beg to call your attention to the ***Mannie Special,*** made almost entirely from charcoal fuel. The phosphorus is high, fully 2 per cent., the graphitic carbon is also high, with combined carbon and sulphur very low, silicon from 2 to 5 per cent., according to specifications. We recommend this iron in a certain proportion, not to exceed 20 per cent., for any kind of work. You can readily tell the amount to use by commencing with about 5 per cent. and increasing the proportion until your castings are as dense as you want them and your test bars stand the requirements of your most exacting customers.

Sample cars furnished on favorable terms. Write for quotations.

Rogers, Brown & Co.

CINCINNATI
BUFFALO
CLEVELAND
NEW YORK
BOSTON
BIRMINGHAM
CHICAGO
ST. LOUIS

Rogers, Brown & Warner,

PHILADELPHIA
PITTSBURG

Convince Yourself, that it's to Your Interest to Use

Obermayer's No. 702 Pure EAST INDIA PLUMBAGO.

WE CLAIM:

1st. It's the only Plumbago on the market today **that can be used either on dry sand or green sand molds, can be dusted on, or applied to the mold by the hand or brush, and makes the best core wash known.**

2nd. We are the only Foundry Supply House who have a most Complete Laboratory for analyzing and testing goods used in the manufacture of our products.

3rd. We give **you better values than any one else.**

4th. We are the largest importers and refiners of Plumbago in United States.

One bbl. 702 Pure East India Plumbago will prove above.

ONCE USED, ALWAYS USED.

THE S. OBERMAYER CO.,

CINCINNATI, OHIO. CHICAGO, ILLINOIS.

Manufacturers "Everything You Need in Your Foundry."

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

Location and area of tuyeres insure the highest melting . . . efficiency. . . . . .

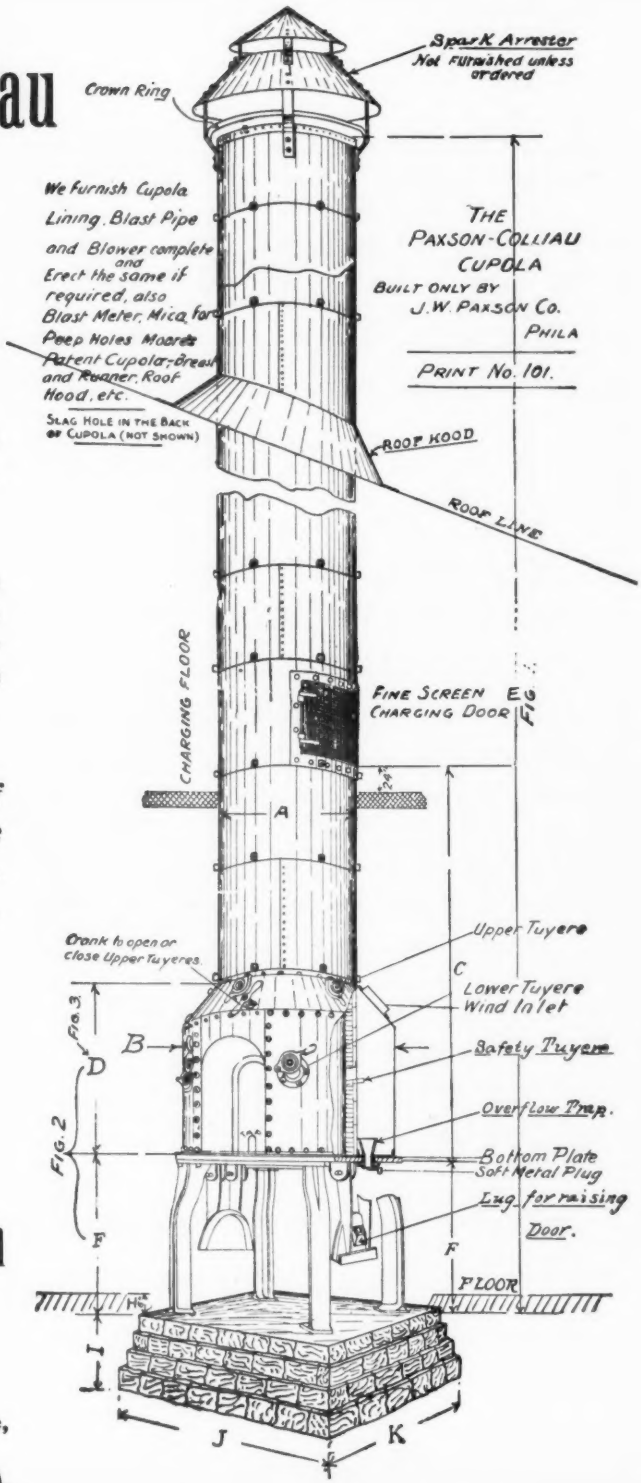
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J. W. Paxson Co.

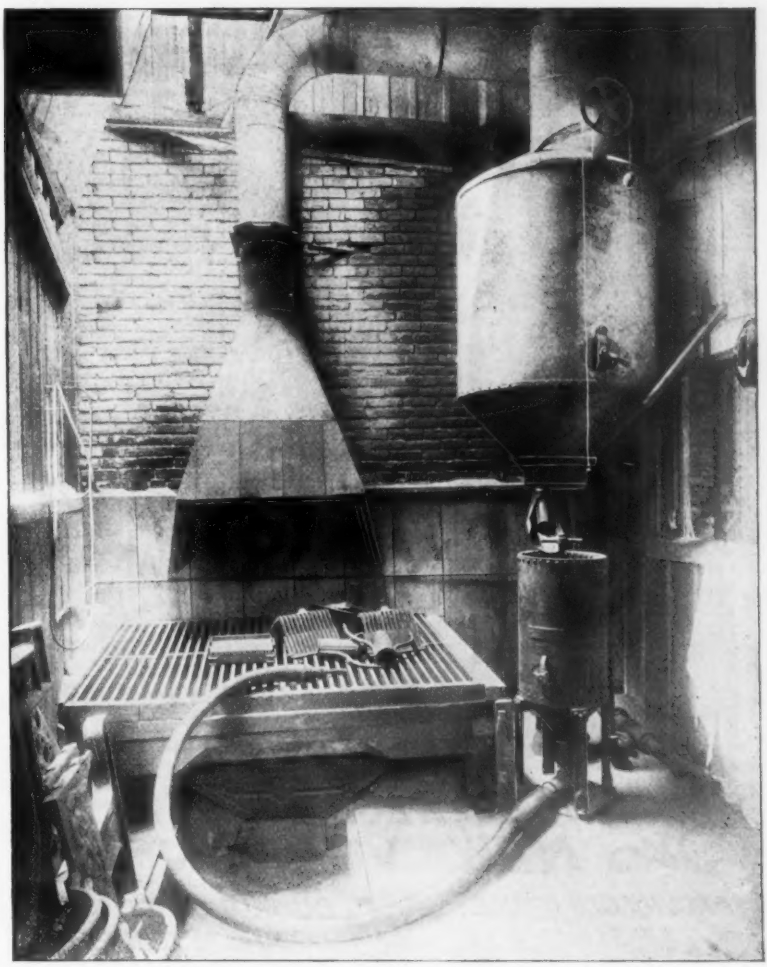
1021 . . .
North Delaware Avenue,

PHILADELPHIA, PA., U. S. A.



PAXSON-WARREN
SAND BLAST
AND EXHAUST SYSTEM, AND SAND BLAST TUMBLING BARRELS.

PATENTED, OTHER PATENTS PENDING.



CUT SHOWS OPERATING ROOM OF MEDIUM SIZED PLANT.

MADE IN THREE SIZES. SEND FOR DESCRIPTIVE CIRCULAR.

APPARATUS BUILT TO MEET MODERN FOUNDRY REQUIREMENTS A DEEP AND EXPENSIVE PIT IS NOT REQUIRED.

J. W. PAXSON CO. MANUFACTURERS AND SOLE AGENTS.

PHILADELPHIA, PA., U. S. A.

WHITEHEAD BROTHERS COMPANY.

MOLDING SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
NEW YORK.

PROVIDENCE OFFICE,
42 S. WATER ST.

BUFFALO OFFICE,
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITON RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L.I.
WATERFORD, N.Y.
ALBANY, N.Y.
CEDAR HILL, N.Y.
COXSACKIE, N.Y.
CLINTON POINT, N.Y.
ATHENS, N.Y.
COEYMANS, N.Y.
WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.

THE ATTAINMENT OF

Crucible Perfection

IS BEST REPRESENTED IN

DIXON'S

For many heats.
For best conductivity.
For the least fuel.
For satisfaction.

Have you ever read our treatise on crucibles? How made and how to use them? Copy free if you would like it.

Joseph Dixon Crucible Co.

JERSEY CITY NEW JERSEY

Who Supplies the Stove Founders?

EVIDENCE INDISPUTABLE.

They are coming slowly but surely. Some are old and tried, such as R. & B. Co. "The Big Yun" is moving cautiously but we have confidence enough in our Facing to warrant us in saying that we will yet succeed in capturing them.

PURCHASING DEPARTMENT

The Michigan Stove Company.

Order No. 10583 Detroit, Mich. February 25th, 1901

Refer to this number in correspondence and on invoices.

Ship .....

Route .....

T.P.Kelly & Co.
544 West Twenty-second St.
New York City

Please acknowledge order and promise date of Shipment.

Please enter our order as follows:

20 barrels .... Charcoal Facing
10 " .... Heavy Facing.

The above to be of same quality as sample barrels submitted and at price agreed upon.

Kindly ship by way of the New York Central and Michigan Central Rys., and trace by wire.

Very truly yours,

The Michigan Stove Co.,

E. J. Barbour

Purchasing Agent.

Consignors are requested to submit invoices same day goods are shipped.

All goods are purchased subject to approval and are returnable at consignor's expense if unsatisfactory.

FREDERICK B. RICHARDSON, PRES'T. AUGUSTUS P. RICHARDSON, VICE PRES'T. HENRY T. RICHARDSON, TREAS. DWIGHT B. RICHARDSON, SEC'Y.

The Richardson & Boynton Co.

OF DOVER, NEW JERSEY.

INCORPORATED 1895.

MANUFACTUPERS OF "Perfect" FURNACES, RANGES AND HEATERS.

WILLIAM L. R. LYND, SUPT. TELEPHONE 14 A.

Dover, N. J., March 1/1901.

Messrs. T. P. Kelly & Co.,

Gentlemen

Please ship immediately, 50 bbls. heavy stove-plate facing same quality as you have been furnishing us for the past six years, and at same price as in the year 1900.

Yours truly.

RICHARDSON & BOYNTON COMPANY
OF DOVER, NEW JERSEY,
WILLIAM L. R. LYND, Sup't.

T. P. KELLY & CO.,

NEW YORK CITY. CHICAGO.

M. CLARK, PRESIDENT. C. W. SCOTT, SEC'Y AND GEN'L MGR.

Cleveland Co-Operative Stove Co.,

....MANUFACTURERS OF....

STOVES AND RANGES.

Cleveland, O. Feb. 25th, 1901.

T. P. Kelly & Co.,

New York, N.Y.

Gentlemen;

Please enter our order for one carload of Facings, specifications to be sent you in a few days. We have now been using your facings for some months and wish to state that of all the facings we have ever used or tried, there is nothing that equals your prepared Charcoal.

Yours truly.

Cleveland Co-Op. Stove Co.

G.W.S. G.W. Scott, Sec'y.

CORCORAN ART GALLERY, Washington, D. C.

Structural Steel

Furnished and Erected by the

American Bridge Company

GENERAL OFFICES 100 BROADWAY NEW YORK

Structural Steel and Iron

ENGINEERS, MANUFACTURERS and CONTRACTORS
FOR BUILDINGS, ROOFS, BRIDGES and ALL CLASSES of
METALLIC STRUCTURES

Branch Offices throughout the Country. European Office: LONDON

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M. M. COCHRAN, PRES.
W. HARRY BROWN, V.-PRES.

JNO. H. WURTZ, SECY-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

5000 TONS DAILY CAPACITY
INDIVIDUAL CARS.

YOUGHIOGHENY .. COAL ..	WASHINGTON .. COKE ..
STEAM, GAS, COKING.	FURNACE, FOUNDRY, CRUSHED.

SHIPMENTS VIA B. O. R. R., and P. & L. E. R. R. and CONNECTIONS.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

William Sellers & Co. Incorp.

PHILADELPHIA, PA.

MODERN FOUNDRY MACHINERY

SAND MIXER

Not an Experiment

PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand,** we have issued a small pamphlet which will be sent on application.

Among late Purchasers are:

American Radiator Co., Buffalo, N. Y.
American Radiator Co., Titusville, Pa.
National Malleable Castings Co., Indianapolis, Ind.
National Malleable Castings Co., Cleveland, Ohio.
Fischer Foundry & Machine Co., Pittsburg, Pa.
R. Hoe & Co., New York.
U. S. Arsenal, Rock Island, Ill.
Michigan Malleable Iron Co., Detroit, Mich.
New York Air Brake Co., Watertown, N. Y.
Norfolk & Western R. R., Roanoke, Va.
And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence is Solicited.

"THE WELLS LIGHT" REG

WALLWORK & WELLS' PATENTS

Over 16,000 in Use.

ALWAYS READY!

800 TO 4,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to all Railroads and Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

ROSS MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g Co., Nos. 44 and 46 Washington St., New York City:

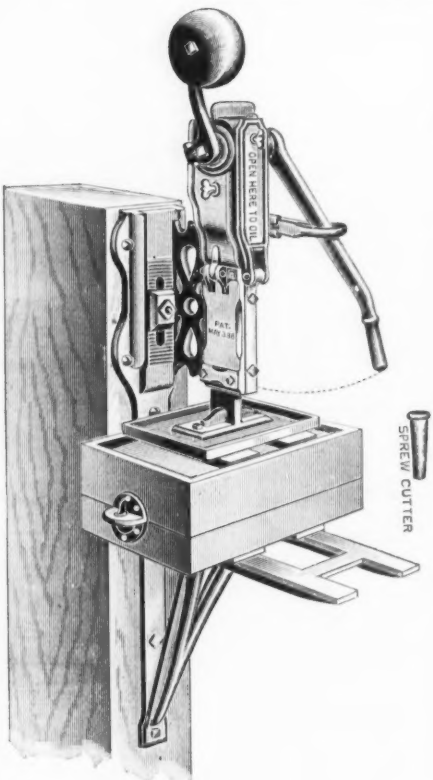
GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y and Treas.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts.

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

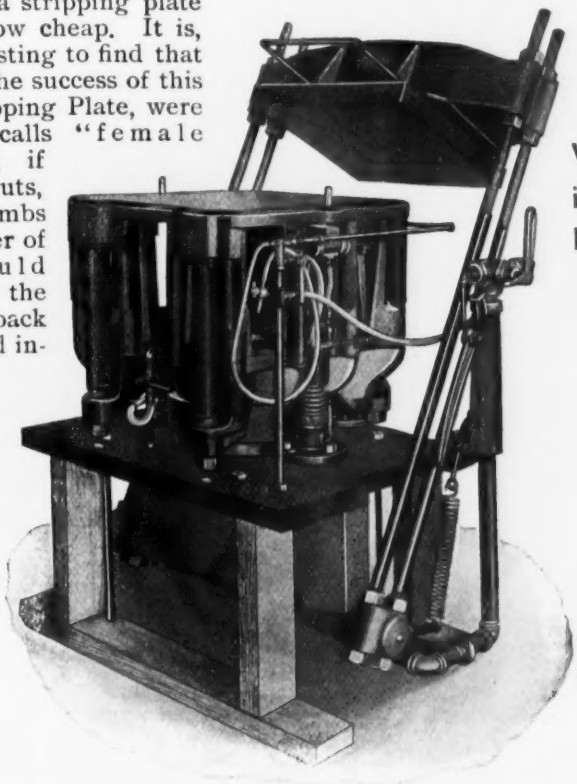
J. W. JACKMAN & CO.
Sole European Representatives, London, S. W., Eng.

A Bit of Molding Machine History.

The first U. S. Patent for any kind of a Molding Machine was issued early in 1852 to a man named Satterlee, and it was quite a machine—seems to have been in appearance about half way between an eight day clock and a cider press—had "wheels"—of odd kinds, gear, sheave and sprocket, had pitman, levers, pawls, counterweights, chains and toggles—more gear than Kipling put into McAndrews Hymn.

All this mechanical uneasiness was to accomplish what the inventor called "the said work of sifting, filling and pressing."

Thus he omitted from the functions of a machine like a perfecting press and costing almost as much, the drawing of the patterns, the ONLY thing that some foundrymen are to-day buying $50 machines to do, on each of which they spend upwards of $1,000 for stripping plates and patterns. Satterlee was evidently ahead of his age in the U. S., for in England the very first idea of a molding machine, patented by one Maullin in 1800, was in effect nothing but a Stripping Plate—like some of our machines today—the $50 for machine, $1,000 for patterns kind. Maullin's machine molded screws (gimlet pointed too!), but even he in 1800 would probably have known better than to try to mold a lock case or a flat bevel gear with a stripping plate rig, no matter how cheap. It is, moreover, interesting to find that contributing to the success of this George 3rd Stripping Plate, were "female worms," which, if they were not nuts, must have been limbs of the old tempter of Eve—which would of course carry the Stripping Plate back before Noah, and indicate that some of its family came through in the Ark.



This is a Vibrator Molding Machine for Flask 26x26.

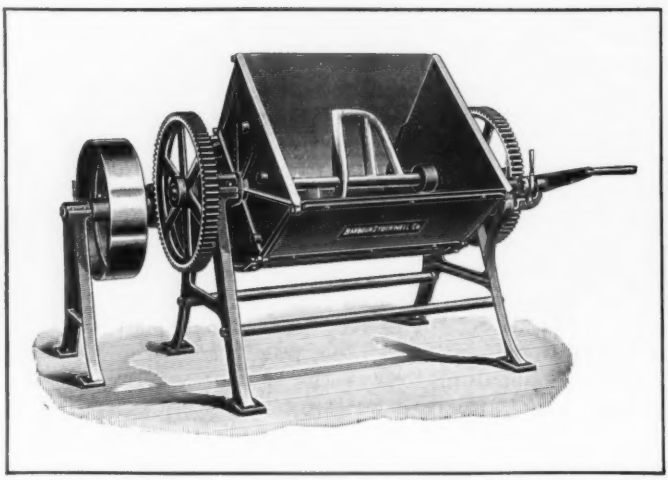
Has 12″ Draft and Power Ramming.

The Tabor Mfg. Co.

ELIZABETH, N. J.

Schuchardt & Schutte, Berlin, Germany. *James Hartley & Co., of Manchester, Ltd., Manchester, Eng.*

Boston Foundry Mixer.



DRIVEN BY BELT OR BY MOTOR.

By its use you have a better mixed core-sand and facing at one-half the cost of that mixed by the old methods.

This Mixer is in use in many of the largest Foundries in the United States.

On Exhibition and For Sale by . . .

THE S. OBERMAYER COMPANY,

18th and Rockwell Streets, CHICAGO, ILL.

FOR PARTICULARS REGARDING OUR MIXER AND SAND SIFTERS, WRITE

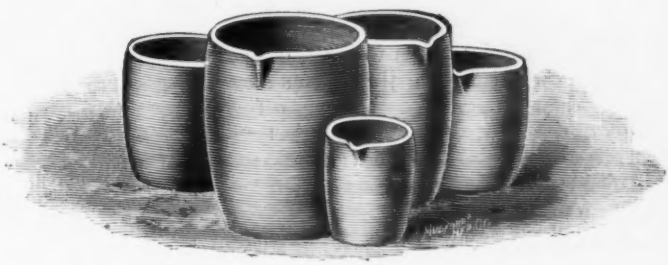
BARBOUR-STOCKWELL CO.

205 Broadway, CAMBRIDGEPORT, MASS.

BRIDGEPORT CRUCIBLE CO.

MANUFACTURERS OF

BLACK LEAD CRUCIBLES

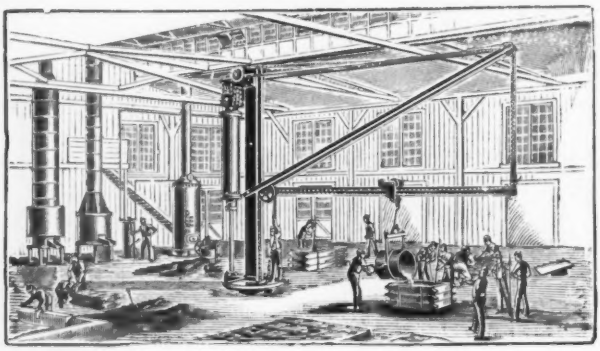


CLIMAX FURNACE CLAY

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U.S.A.

LEVEL HEADED FELLER THIS.



5-Ton Steam Hydraulic Crane in a Foundry.

In the January number of the *Engineering Magazine* is an article by a Foundry expert entitled "Modern Foundry Practice."

Here's what he says:

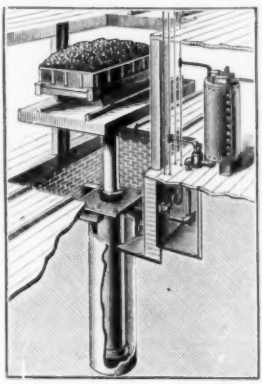
"The question of the most suitable lifting appliances for foundry work is one rather open to discussion, but probably the best arrangement is an overhead traveller electrically driven, and Hydraulic jib cranes on the wall posts or columns below.

"The traveller should be of sufficient capacity to hold the heaviest loads, while the jib cranes should be of lighter type and be used for lifting off boxes, drawing patterns and putting in cores. A travelling crane alone is almost valueless, for in the majority of cases fully half the men stand waiting for lifts, most of which are light loads."

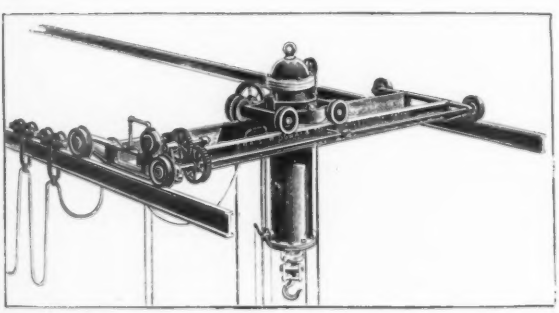
We just give the above as a straw to show how the wind blows.

The Crane for the Foundry is the Ridgway Balanced Steam Hydraulic. You'll find it out some day.

Same molders for same wages do 50 per cent more work.



Hydraulic Air Hoists.



When you buy anything the best is none too good. Oil Governed Air Hoists are the only sort to get. Best shops get them. Cost a little more, but you don't kill anybody, and can safely handle any kind of work.

"Please Take the Elevator"

Hook 'er to the Bilers.

Craig Ridgway & Son Co., ...Coatesville, Pa.

European Agent—CHAS. C. ECKSTEIN. 16 Spandauerstr., BERLIN, GERMANY.

Roots' Positive Pressure Blower

ALWAYS THE STANDARD

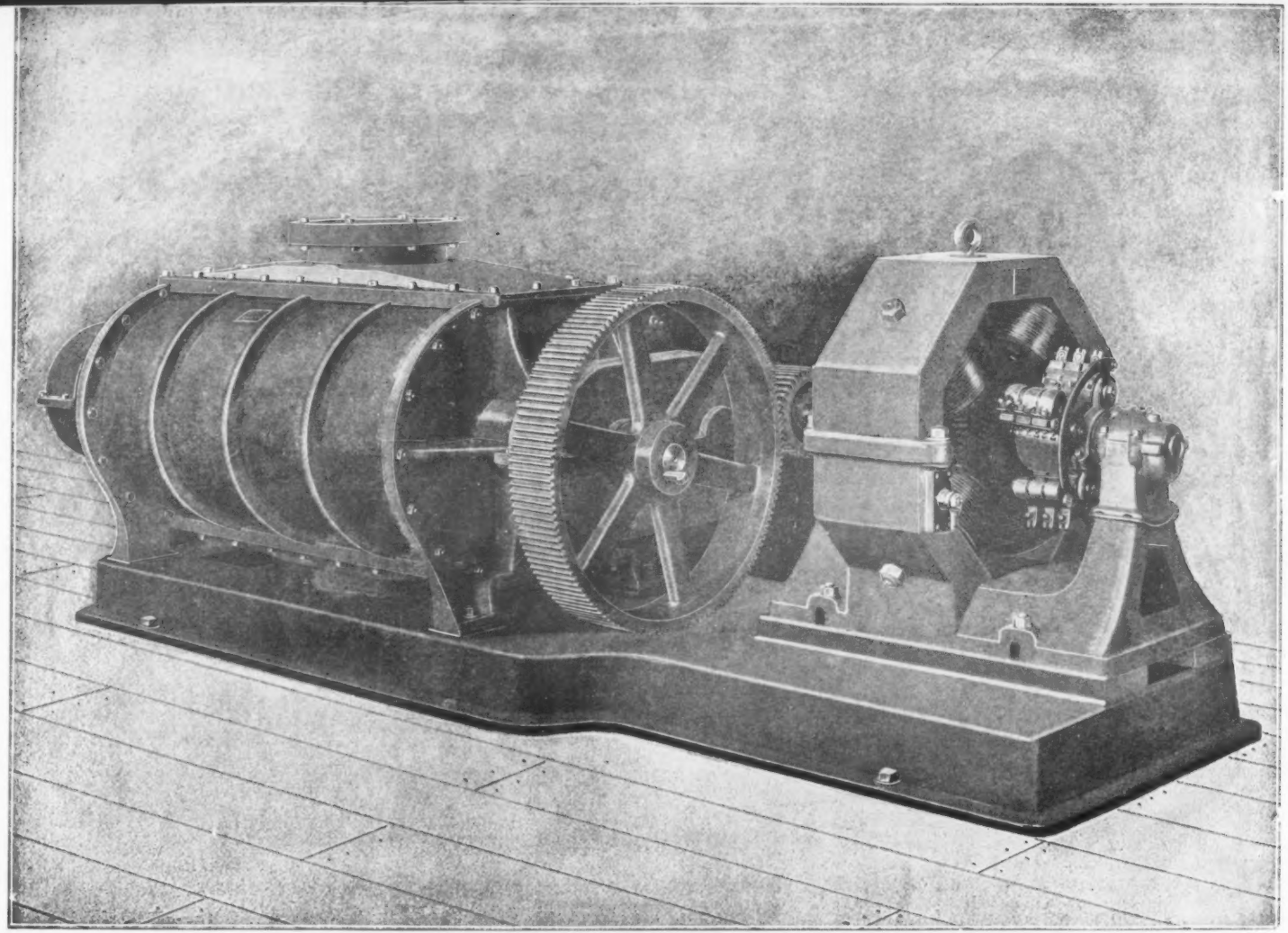
Established 1859.

The ROOTS obtains the minimum of friction and the maximum of efficiency Others cannot—do not

P. H. & F. M. ROOTS CO.

HOME OFFICE AND WORKS,
CONNERSVILLE, INDIANA, U. S. A.

NEW YORK OFFICE, 109 Liberty Street.
CHICAGO OFFICE, 1538 Marquette Building.
PITTSBURG OFFICE, F. R. Dravo & Co., 812 Lewis Block.
CLEVELAND OFFICE, F. R. Dravo & Co., 707 New England Building.



ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR.

ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR.

OUR COMMERCIAL TOURIST

REPRESENTING

The entire Ohio Valley product of MOLDING SAND Superior to any for wear and surface, and the largest body of Molding Sand under one control, together with 6,300 feet of railway siding, making an unlimited capacity.

MASTER VAN DYE

Molding Sand not equaled for Stove Plate, Hardware, Malleable or Grey Iron, light, medium, or heavy. Agricultural work, fine Brass and Core Sand, all of which are fully guaranteed as above.

Standard Molding Sand

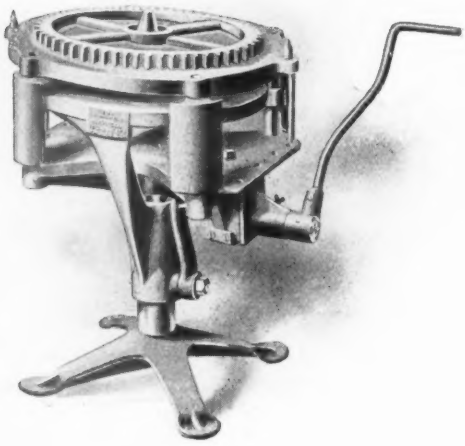
IN USE FOR FIFTY YEARS

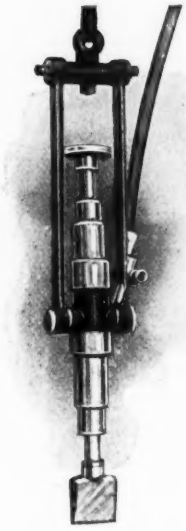
OUR Specialties are: No. 5 and No. 6 Newport, fine; No. 5 Indiana, strong and fine; No. 2 Indiana, red floor sand, and New Albany, medium fine. Having absolute control of every variety we represent, being 15 distinct and superior sands, we can satisfy the most skeptical user.

The Newport Sand Bank Co., NEWPORT, KY.

We own ALL of the FAMOUS NEWPORT SAND and are the ONLY SHIPPERS of same. The BILLING will show DECEPTION of IMITATORS.

A Great Combination!





The Maywood Molding Machine
AND
The Maywood Pneumatic Rammer

are two things essential to the majority of foundries.

One helps the other along and between them they make easy work for the molder and money for the foundryman.

Anybody can build molding machines but it is the knowing how which makes practical machines. We know how.

Our method of fitting up patterns costs less than any other and is the most efficient.

Let us have a description of the castings you make in considerable quantities. We will then give you an idea of what our machines can do for you. Remember, we build the machine to suit the job.

Maywood Foundry & Machine Co.,

Maywood, Illinois, U. S. A.

Coburn Trolley Tracks

carry more light and medium heavy loads every day than all other forms of shop transportation.

This thing of calling three or four laborers whenever anything has to be moved is a thing of the past in shops that are up to date.

Such slow, cumbersome methods of getting things shifted around cost too much.

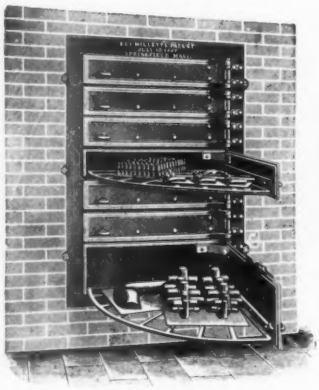
A trolley track will do the same work in one tenth the time without bothering anyone. If a load is too heavy for one man to handle, hang an air hoist on your trolley track and you got a machine that will do the work of a dozen men.

Save your expensive cranes the wear and tear of running from one end of the foundry to the other, picking up light loads. A twenty and thirty ton crane was never intended for such business.

Put in a trolley track. We will be glad to give you an estimate as to its cost. The figures will show you how little that is.

Coburn Trolley Track Mfg. Co

HOLYOKE, MASS., U. S. A.



The difference

between a good core and a poor one is caused by the way the core is dried. You can not expect a perfect core when you are opening the door of the ordinary core oven every few minutes throughout the day. While the door is open the oven ceases to work and even after the door is closed it takes it a long time to get going again.

With the **Millett Core Oven** you can take all the time you need to empty its shelves and loading them up again. The door at the back keeps the oven working all the time and you can get a perfect core any time you want to without interfering with anything.

We build two styles of ovens. The one illustrated above is the larger size and built in a very permanent manner. The one shown below is intended chiefly for small shops and is portable. It is ready to bake cores the minute it lands in your foundry.

The Millett Core oven is in use in all parts of the country and we shall be pleased to mail you a list of purchasers, when it is likely that you can see it in operation without going far from home.

Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

Nothing But Foundry Irons.

The fact that the **Cherry Valley Furnace** makes nothing but foundry iron is in itself a guarantee of uniformity in its product, and it is this uniformity which makes **Cherry Valley Iron** so much more reliable than the brands of furnaces which make foundry iron today and other grades tomorrow.

When a furnace changes from one ore to another there is a mixture of grades produced which confuse the foundryman and make trouble for him if he is making castings which have to be finished.

In order to further insure the superiority of the **Cherry Valley Iron** we also make our own coke. Coke has got a great deal to do with the making of a first-class iron. A poor coke has the same effect in the blast furnace as in the cupola and every melter knows what it will do in the latter place.

The ores we use in making **Cherry Valley Iron** are selected only after a careful analysis has demonstrated their worth. Our aim is to make an iron that shall have strength as well as softness, and the fact that the principal makers of machinery castings use **Cherry Valley Iron** in preference to any other brand is convincing proof that its good qualities are appreciated.

Let us send you a car load of the finest foundry iron made anywhere.

The Cherry Valley Iron Co.,

Murtland Building, Pittsburg, Pa.

It is Easy Enough

to get something which will fill a hole. Babbitt or Lead will do this, so will Plaster of Paris.

But these things will not make a permanent repair. They are one and all affected by heat and cold, expansion and contraction. In short, they are only fillers.

Our SMOOTH-ON Preparations

are not fillers. Each one is made for use only under certain conditions.

Our SMOOTH-ON Castings is made for the special purpose of repairing castings that are leaky under pressure or having sand holes or blow holes which affect their appearance only.

SMOOTH-ON here makes a permanent repair, in fact the appearance of the casting in color and finish is the same as if it had been perfect at the start.

We also make SMOOTH-ON for the use of engineers and plumbers in repairing steam pipes, cylinders, radiators, in fact anything of iron which is not perfect.

Our booklet of SMOOTH-ON Compounds should interest you. Write for it.

Meanwhile send for a small can and try its contents when you have trouble. You will soon send us a larger order when you know its good qualities.

The Smooth-On Mfg. Co.,

JERSEY CITY, N. J.

REYNOLDS, CHALOU FOUNDRY CO.,
MANUFACTURERS OF JOBBING WORK
Machinery and Grey Iron Castings.
Patterns From Wood A Specialty.
— BURDETT FOUNDRY. —
Telephone 319. Cor. Ingalls and 7th, Avennes.

Troy, N. Y. Feby.18th,1901

Messrs.Clarkson & Ford,

#224 & 226 Front St. New York.

Dear Sirs:-

Replying to your favor of the 1st inst. would say,the trial we have given your Core Oil,has proved itself very satisfactory. It is the only Core Oil we have tested that has equaled Linseed.In fact,we prefer it to Linseed,as it has not the disagreeable gases common to Linseed, neither are we using any more of the Perfect Core Oil than we did of Linseed,and making better Cores.

You may enter our order for one barrel at the price quoted us, 50 cts. per gallon, F.O.B. Troy, N.Y.

We enclose check for $6.00 for sample can sent us.We shall return the can when empty and deduct the price of same when next remitting you for the barrel now ordered.

Respectfully,

Reynolds, Chalou Foundry Co.

M. H. Fallon

Treasurer.

Any foundry can obtain the same results, as it entirely depends on the quality of the sand you are using.

Perfect Core Oil

Will never blow castings. Will let the air and gases off from the core which is difficult to vent. Leaves castings smooth, dries open and porous inside, and hard outside, yet the metal will lie well to it. Will not absorb moisture. Saves all cost of cleaning cores out of castings, as it will run out free as the fresh sand.

Write for Booklet ! ! !

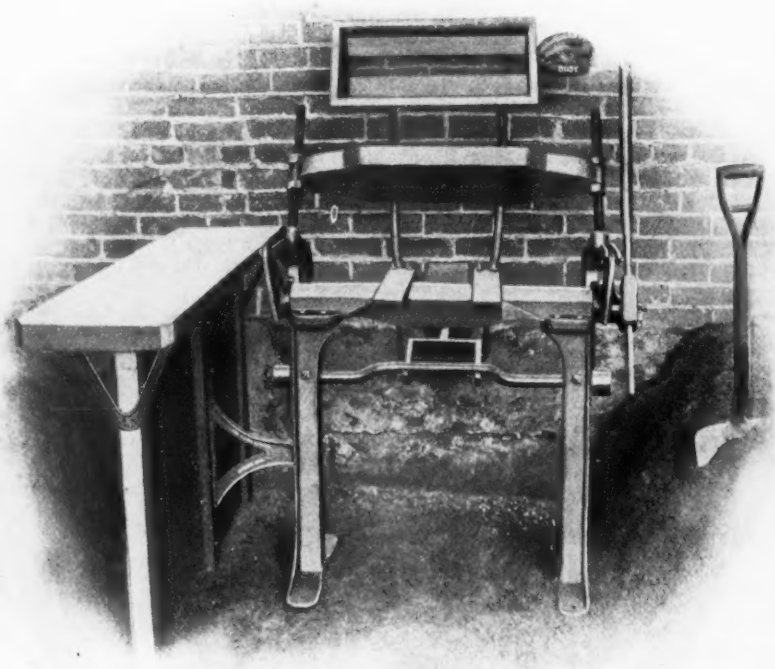
Also, mail us a small box of the sand that you are using, and we might be able to give you information which would be of value to you.

PRICE PER GALLON, 50 CENTS.

CLARKSON & FORD, 224 Front Street, New York City, U. S. A.

The Farwell Molding Machines

SEND FOR CATALOGUE



Patented Dec. 21, 1897 and Nov. 22, 1898.

The above cut shows the Farwell Molding Press with double Tool Shelf and Dust Bag Holder. Also Long Side Shelf to hold match, flask, etc., under which is a partition to divide the floors. Other styles and sizes shown in our catalogue which will be sent on request.

MANUFACTURED BY

THE ADAMS COMPANY,

Dubuque, Iowa, U. S. A.

J. W. JACKMAN & CO., British Agents,
London, S. W., Eng.

STEEL PLATE
EXHAUSTERS

FOR TUMBLING BARRELS AND EMERY WHEELS

They keep the atmosphere clear and free from dust. Arranged to be driven by belt or by direct connected electric motor. ::

B. F. STURTEVANT CO.

BOSTON, MASS.

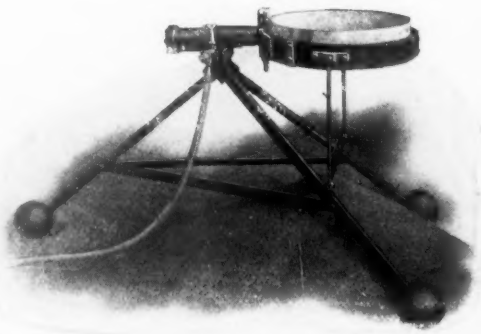
NEW YORK PHILADELPHIA CHICAGO LONDON

To the Foundrymen:

That class of manufacturers who are in the commercial reports rated as No. 1 and A 1, and that you hear spoken of as "progressive," "up-to-date," and who are supposed to do things almost right, those are the kind of people whom a person putting a new labor-saving device or appliance on the market is pleased to get inquiries from; and we are getting them —lots of them.

Our correspondence and order book do not at present make a complete directory of all of these people in the whole world, but it is growing, and to make it grow more is the reason for using this advertising space.

We shall not try to tell you all of the good points of the Hanna Pneumatic Screen Shaker in a single page Ad., but we have a small folder on this subject that is just bristling with good points, and to the man who is sufficiently interested to ask for this folder it will be gladly and promptly sent.



We are supposed to have the addresses of all the foundrymen in the United States, but consider that the man who is not sufficiently interested in reducing the cost of his work to ask for information on a subject of this kind, is not sufficiently interested to preserve, or even read our advertising matter if sent to him. Therefore, we are asking for your inquiries.

Address

E. E. HANNA,

751 Cullom Avenue, CHICAGO, ILL.,

OR

THE S. OBERMAYER CO.,

Sole Western Sales Agents,

Cincinnati, Ohio, or Chicago, Ill.

ANNOUNCEMENT

We hereby notify you that the name of our corporation has been changed from McCULLOUGH-DALZELL COMPANY to

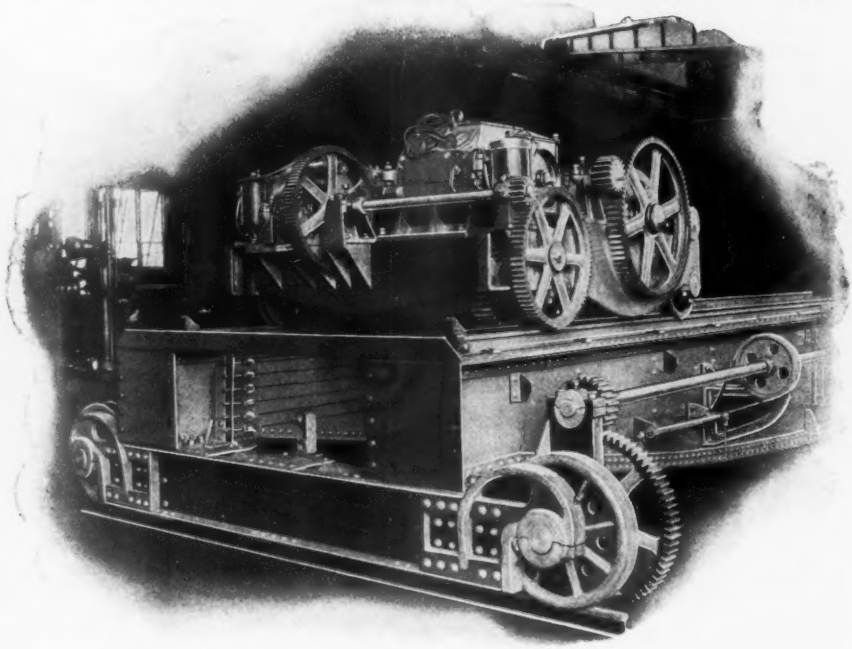
McCullough-Dalzell Crucible Company

We will continue the business under the same management that has been in charge from the organization of the Company in 1872; and the high standard that has distinguished our goods for nearly thirty years will be maintained.

RESPECTFULLY,

McCULLOUGH-DALZELL CRUCIBLE COMPANY

PITTSBURGH, PENNSYLVANIA



30 TON ELECTRIC TRAVELING CRANE.
View shows the construction of our improved "Underbody" truck, furnished only with "Whiting Cranes."

CRANES FOR ALL PURPOSES

ELECTRIC, AIR AND HAND, ALL STYLES

AIR HOISTS VERTICAL AND HORIZONTAL TYPES.

Elevators for Foundries, operated by Electric, Compressed Air or Belt Power.

The Whiting Cupola

WELL CONSTRUCTED, GOOD RESULTS, 750 IN SERVICE. THE BEST ON THE MARKET.

Engineers and Designers of Complete Foundry Plants.

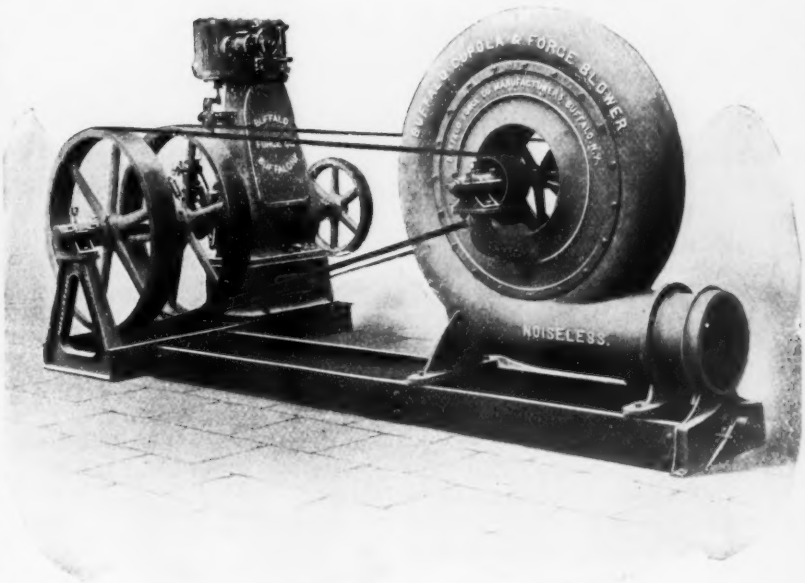
CATALOGS 18, 20, 21 FREE ON APPLICATION.

WHITING FOUNDRY EQUIPMENT CO.

GENERAL OFFICE AND WORKS:
LATHROP AVENUE, HARVEY, ILL., U. S. A. (CHICAGO SUBURB).
CHICAGO OFFICE: 1543 MARQUETTE BUILDING.

Buffalo Cupola Blowers

Buffalo Steel Pressure Blowers. Varying sizes, Steam, Pulley, Electric, for Forge Fires, Cupolas and all High Pressure Blast Service.



Buffalo Forge Company,

BUFFALO, N. Y.

NEW YORK. **CHICAGO.**

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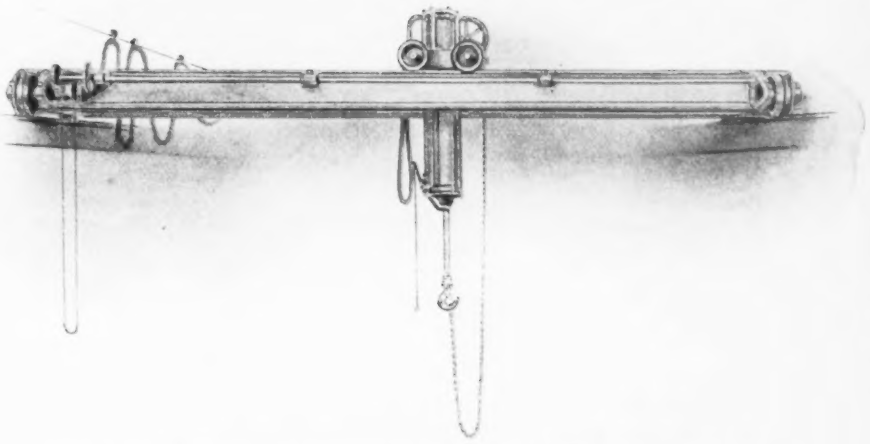
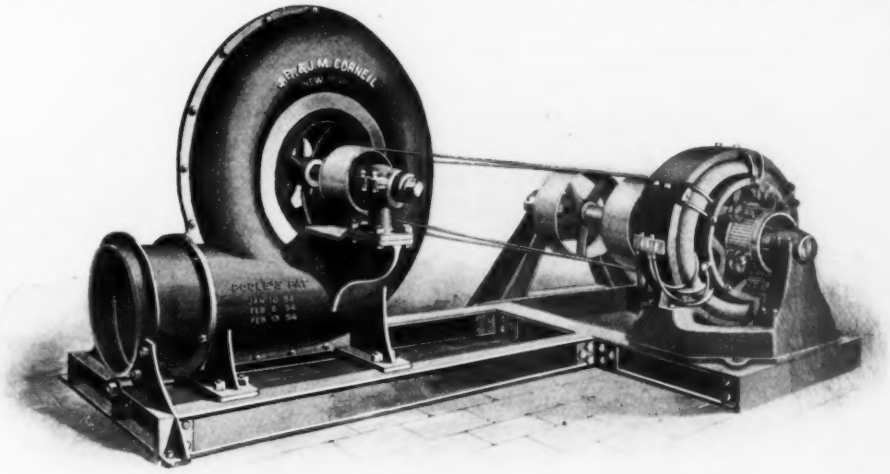


This is our Type No. 131 Pneumatic Traveling Crane with motor travel.
An excellent crane for many classes of Foundry service.
If you prefer an Electric or a Hand Power Crane we can suit you. Write us.

Northern Engineering Works, 4 Chene St., DETROIT, MICH.

The Cornell Blower.



Some foundries prefer to operate their blower with an electric motor. For such we build a special extension base as shown in illustration. A very compact and substantial arrangement.

J. B. & J. M. CORNELL, 26th Street and 11th Avenue, NEW YORK CITY.

Undisplayed Advertisements.

Rate thirty cents per line each insertion. Answers addressed to our care will be forwarded.

WANTED—A first-class salesman to sell steel castings. Write, stating age, experience and salary expected. P. O. BOX 1042, PHILADELPHIA, PA.

WANTED—A couple of molders for light and medium machinery castings. Sober men only need apply. No strike, steady work. CRESCENT MACHINE CO., Leetonia, Ohio.

WANTED—Assistant foreman in malleable foundry. Young, experienced man familiar with piece work prices. Address "ASSISTANT," Box 500, care THE FOUNDRY, Cleveland, Ohio.

ROOT BLOWERS, Nos. ¼, ½, 2, 3, 4 and 7. STURTEVANT BLOWERS, Nos. 2, 3, 4, 5, 6 and 7. Curtis Air Hoist for elevator or crane, nearly new. A. ASHER, 2nd floor 109 Liberty St., New York.

WANTED—Competent molder under 45 years of age to become financially interested, same time act as foreman. Address BOX "A," ASHTABULA, Ohio.

WANTED—Bright young man capable of handling foundry laborers in malleable iron foundry. Address "C. M. B.," Box 502, care THE FOUNDRY, Cleveland, Ohio.

WANTED—Position as foundry superintendent or foreman. Best references from past and present employers. Address "SUPERINTENDENT," Box 485, care THE FOUNDRY, Cleveland, Ohio.

WANTED—Position as foreman of core department; 18 years' experience on light and heavy cores. Address "COREMAKER," Box 505, care THE FOUNDRY, Cleveland, Ohio.

WANTED—An experienced man wishes position as foreman in gray or malleable iron foundry. Reasonable terms. References. Address "MALLEABLE," Box 504, care THE FOUNDRY, Cleveland, Ohio.

WANTED—A competent foundry foreman familiar with general castings work. Good position for right man. State age, experience and give references. Address "GENERAL FOREMAN," Box 509, care THE FOUNDRY, Cleveland, Ohio.

FOR RENT—Year lease or longer, a very desirable foundry in a flourishing town adjacent to Cleveland, Ohio, fully equipped for light work. Terms of lease very desirable. Address "BARGAIN" Box 503, care THE FOUNDRY, Cleveland, Ohio.

WANTED—A foundry and machine shop of moderate size, advantageously located, doing a paying business; or foundry alone, with room to build machine shop. Address "X MACHINE CO.," care Evansville Ice & Storage Co., EVANSVILLE, Ind.

WANTED—From a practical pipe man, a set of plans for a modern and up-to-date Cast Iron Pipe Foundry Plant, for making sizes of pipe up to 36 inches diameter. State terms. Address "PIPE FOUNDER," Box 510, care THE FOUNDRY, Cleveland, Ohio.

WANTED—I would like to correspond with firm wishing competent and experienced foundry superintendent or foreman. Address "FOREMAN," Box 507, care THE FOUNDRY, Cleveland, Ohio.

CHEMIST WANTED—One accustomed to analyze steel as well as gray iron castings. Only those who have practical experience will be considered. Address "CHEMIST," Box 490, care THE FOUNDRY, Cleveland, Ohio.

WANTED—A thoroughly practical and experienced superintendent for a malleable iron foundry. Must understand mixing and also be a master of men and be able to produce at low cost. J. F. CURTIS, care Chas H. Binney, 204 Dearborn St., Chicago.

WANTED—Experienced core room foreman in malleable foundry. Must be familiar with piece work prices. Young and energetic. Good opportunity to advance. Address "CORE ROOM," Box 501, care THE FOUNDRY, Cleveland, Ohio.

WANTED—First-class foreman for foundry in New England, working about 30 molders on high grade machine tool work. State experience, age and salary expected. Address "NEW ENGLAND," Box 506, care of THE FOUNDRY, Cleveland, O.

SITUATION WANTED—As superintendent chief or consulting engineer with progressive concern; technical education; 11 years' practical experience; expert on melting and mixing, and successful experience in management of help, mechanical and chemical work, estimating, etc. Address "AN ENGINEER," Box 486, care THE FOUNDRY, Cleveland, Ohio.

BLOWER BARGAINS.

Roots second-hand, bought, sold or exchanged. All my blowers are overhauled by expert blower machinists. I do not advertise a "fake" list of blowers not in my possession; my stock is constantly changing. Write for particulars and prices.

H. M. PAPWORTH,
Ground Floor, 109 Liberty St., New York City.

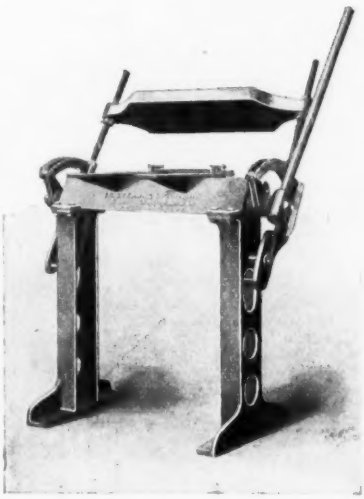
FOR SALE—A foundry and machine shop located in Oregon in heart of mining and lumber territory. Doing good business and with brilliant prospects, as the development of the great natural resources of the surrounding country is only in its infancy. No opposition for 300 miles on either side. Best of reasons for selling. Address "PACIFIC," Box 508, care THE FOUNDRY, Cleveland, Ohio.

WANTED

A foundry in Chicago or vicinity to become interested in a new process for making grate bars, sash weights, coal hole castings, elevator weights, brake shoes and other articles on which there is no machine work. The plant at present engaged in this work is unable to supply the demand. The business will amount to from 30 to 50 tons per day and a profit of 50 per cent is guaranteed.

The foundry desiring this business must have sufficient capacity and capital to handle the trade. Would also make arrangements with parties who have the capital and are willing to build a plant and take care of it.

For further information address **"New Method,"** Box 511, care **The Foundry,** Cleveland, Ohio.



THE *Stearns*

MOLDING MACHINE

Patented September 25, 1900.

Will do the most work in the shortest time with the least fatigue to the operator.

THE PERFECTION OF MOLDING MACHINES.

MANUFACTURED BY

E. C. STEARNS & COMPANY, SYRACUSE, N. Y., U. S. A.

HARDWARE MANUFACTURERS, FOUNDERS OF FINE GRAY IRON CASTINGS AND MAKERS OF THE STEARNS SNAP FLASKS. :: :: WRITE FOR CIRCULAR.

What Four Rammers Can Do:

Four men with pneumatic rammers can do the work of a gang of twenty with ordinary rammers, and the work will be done better.

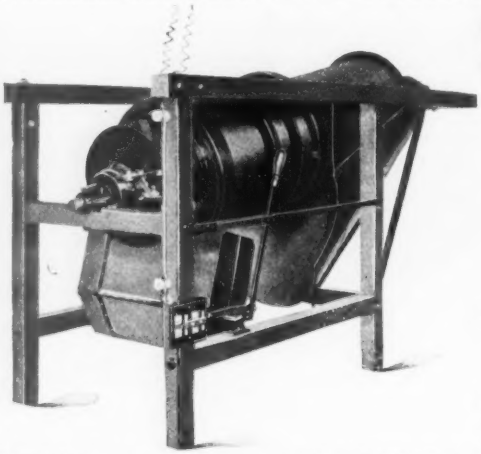
Our No. 8 Hand Rammer can be used alone, or as an auxiliary to a suspension rammer. It is light yet immensely powerful. It weighs only 45 pounds and strikes 300 blows per minute.

You quadruple the capacity of this part of your plant the day you put in our Pneumatic Rammer.

Send for Catalogue of our Pneumatic Tools—Chipping and Riveting Hammers, Piston Drills, Rotary Drills, Rammers, etc.

PHILADELPHIA PNEUMATIC TOOL CO.,

Philadelphia. New York. Pittsburgh.



Save YOUR IRON

Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months.

EDWARD H. SLEIGHT, Prest. & Treas. HENRY H. LAGE, Secretary.

MOLINE PUMP COMPANY.

MOLINE, ILL., Sept. 17th, 1900.

Barnard & Leas Mfg. Co., Moline, Ill.

Gentlemen:—In accordance with our contract, that in case you could show on test of your Magnetic Separator that it would net us fully 25% each year, on the investment price of $300, that we would order one, we hereby enclose order for one Magnetic Separator and have to report as follows as to result of test:

We saved up the waste from our foundry and cupola for five heats (we melting every other day or three times a week and averaging some 5,000 lbs. of iron each heat). This waste saved from the five heats weighed 8350 lbs., and on running it through your machine it separated and saved 1201 lbs. of iron.

On this showing we calculate the machine ought to net us after deducting all expenses of operating same, at least 35% each year on the cost price of $300. We consider this a strong test of the machine, as we had our cupola and other waste well picked over by hand before putting it aside for the trial test, and furthermore, before the test was made we fully believed that our waste of iron was so small that it would not warrant us to buy one of your machines at any price. Very truly yours, MOLINE PUMP COMPANY,

E. H. SLEIGHT, Prest. & Treas.

Give this machine a trial. The saving will surprise you. Write for prices and discounts.

Barnard & Leas Mfg. Co., ***Mill Builders and Mill Furnishers, MOLINE, ILL.***

ALL STYLES **CRANES** ANY CAPACITY

THE **CASE** MANUFACTURING CO.,

COLUMBUS, OHIO.

AIR COMPRESSORS FOR OPERATING

Pneumatic Chipping Hammers, Hoists, Casting Cleaners, Sand-Blast Machines, Molding Machines and other appliances in foundry work. Send for complete Catalogue No. 11 G. just issued.

Clayton Air-Compressor Works, 26 Cortlandt St. NEW YORK

Builders Iron Foundry,

PROVIDENCE, R. I., U. S. A.

GRINDING AND POLISHING MACHINERY

carried in stock. Made with the intention that it shall be the best in the market.

SAND BLAST MACHINERY

For removing Scale from Iron and Steel Plates, Bars, Forgings, etc., also cleaning Iron, Steel and Brass Castings

SOLE AGENTS:

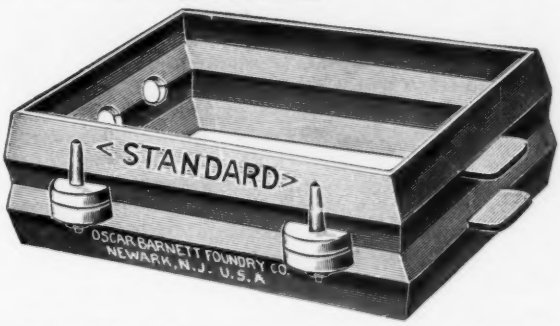
GEO. NASH & CO.,
24 So. Clinton St., CHICAGO.

E. T. WARD & SONS,
23 Purchase St., BOSTON.

Write for full Particulars.

WE ARE FOUNDERS, THE KEY TO PROMPT DELIVERIES.

Interchangeable Steel Pins



Perfectly Fitted All Faces Level

Our Testimonial. The Oscar Barnett original **<STANDARD> BEVEL FLASK,** our product the last fifty years, requires no ribs, sales increasing yearly. Why use inferior grades? We guarantee ours! Complete Equipment Catalogue for the asking

THE PLEASURE OF SUBMITTING PRICES IS SOLICITED.

N. B.—Always state exact depth of Pin Part and other Half Flasks, also width and length inside at parting.

MANUFACTURERS OF HARDWARE AND TOOLS.

Oscar Barnett Foundry Co.,

L. D. PHONE 1045. Bruen, McWhorter and Hamilton Sts., Newark, N. J., U. S. A. ESTAB. "45."

Heyl & Patterson,

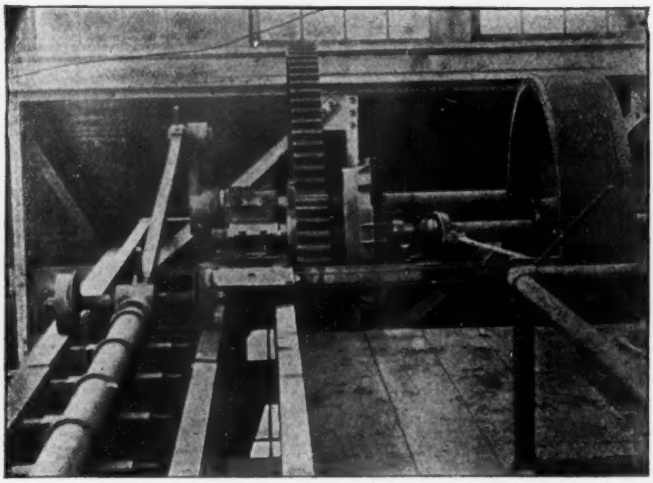
ENGINEERS AND CONTRACTORS,
PITTSBURG, PA.

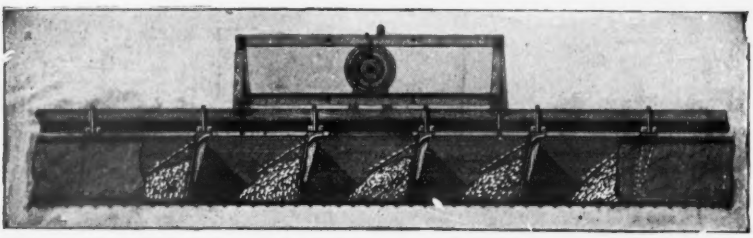
ELEVATING AND CONVEYING MACHINERY.

RECIPROCATING CONVEYORS FOR TRANSPORTING SAND.

FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.





Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, Wilmerding, Pa.

PATENTS PENDING.

Complete Installations.

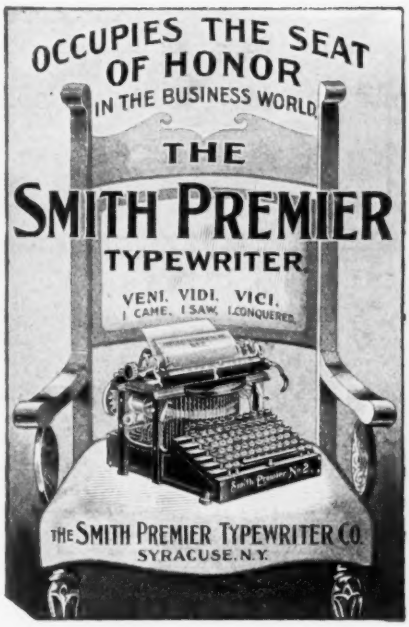
U.S. TIN

is used in making brass and bronze castings; it makes a superior metal, sounder castings, more homogeneous in structure, richer color, better wearing metal, of higher surface lustre than alloy made with imported tin. U. S. TIN is to be used in same proportions as imported tin.

The Price is Much Lower.

The difference in price, the superiority of metal, and sounder castings should induce all users of metals to make comparative tests. We will send to responsible parties small lots of the U. S. TIN on approval, and if satisfactory will make contracts covering a given time. Shall be pleased to correspond with all who may be interested.

THE AJAX METAL COMPANY, PHILADELPHIA, PA.



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We can ship standard sizes from stock. We make any kind you want to suit your work.

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ESTABLISHED 1875.

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FOR ALL PURPOSES.

The oldest and largest manufacturers in the world.

PORTABLE EMERY GRINDER.

Take the tool to the work and save heavy handling.

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The persistent rumors and statements current associating and connecting this Company with certain Consolidations or Trusts, prompts us to make our position clear to our friends, by a formal statement which we trust will firmly and finally establish the fact of our independence. The United States Radiator Company is an absolute Independent Corporation, operating under the Laws of the State of New York and is not controlled, allied with, nor has it any connections, agreements or understandings with any other Company, Trust or Association, engaged in the manufacture of radiation, in any shape, manner or form whatsoever.

United States Radiator Company,
ROBERT J. GROSS, President.
Attest: WILLIAM C. MARSH, SECRETARY.

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Three second-hand Portable Millett Core Ovens. These ovens have been in use only a short time, are in perfect order, practically just as good as new, proved most successful in baking cores. The reason for selling them is the enlargement of our core room necessitating larger ovens. Address

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MATTHEW ADDY & CO.,

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American Pig Iron. Foreign Pig Iron.
In bond or duty paid.

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Pig Iron

Foundry,
Malleable,
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Let us quote you prices.

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Manufacturers, Operators and Shippers of
NEW PROCESS AND ALL GRADES OF MOULDING SANDS.

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with the outlay incurred, there is no better proposition on the market, for the man who wants to reach the foundry trade, than to invest his money in its advertising columns.

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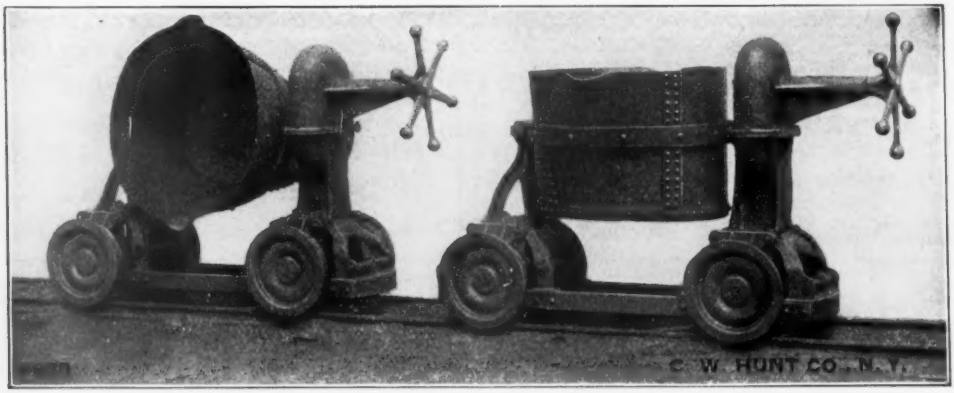
Box 812, Scranton, Pa.
Established 1891. Capital $1,500,000.



Ladle Cars, 1,500, 2,000, 3,000 Pounds Capacity.

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Our system of narrow-gage tracks, switches, curves, turntables, etc., for use in manufacturing establishments and to accommodate such special cars as the above, is worthy of careful investigation by those who are apt to be interested.

We shall be pleased to furnish full particulars upon application. Address the works direct.

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SHOULD READ

"Metallurgy of Cast Iron."

They will thereby become better acquainted with the principles which underlie successful founding. This book contains 583 pages and has 107 illustrations. It tells so many things that we can not give an index to same in this space.

Three dollars brings it right to your door.

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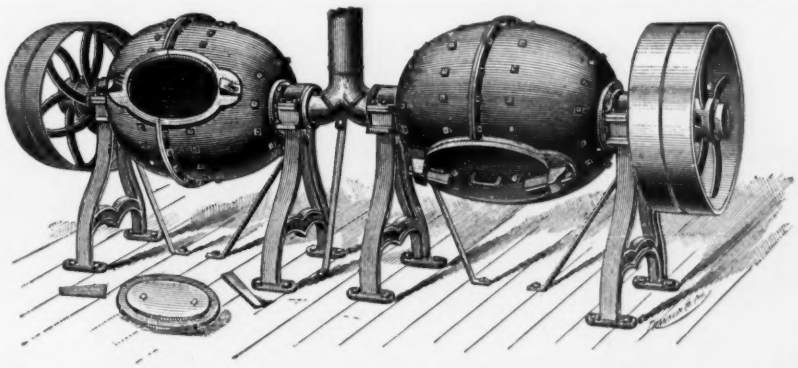

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The Stover Egg Shaped Barrel does double the work of any other, with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

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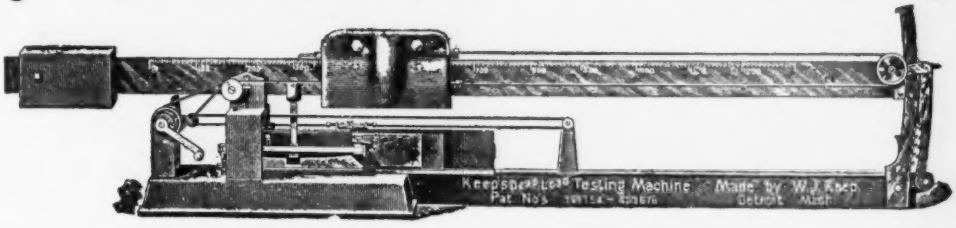

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AT A LOW PRICE.

Send for Testimonials and for Description of

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IRON FLASKS FOR BRASS FOUNDRIES

Best Results.

Latest Improvements.

Guaranteed Perfect.

Thousands in use Everywhere.

LATEST AND BEST PATENT IMPROVED RIBBED AND BEVELED FLASKS.

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INSPECTED FOUNDRY IRONS . . . .

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Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture?

DEAL WITH THE MANUFACTURER DIRECT.

YOUR IRON CONTRACTS

In making your contracts for 1901 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

"PIONEER,"
"ANTRIM,"
"ELK RAPIDS."

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

Superior Charcoal Iron Co.

911, 912, 913 Michigan Trust Bldg.,
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CORE COMPOUND

"ON PAROLE"

Put a 5 gallon sample can of

GLUTROSE CORE COMPOUND

in your core room

ON ITS GOOD BEHAVIOR

If you say it's all right

YOU PAY FOR IT

otherwise we lose.

When you consider the possible number of foundries that may accept this offer, you will realize that we could not afford to make it unless we had, from experience, knowledge of the value of

GLUTROSE
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AMERICAN GLUTROSE WORKS
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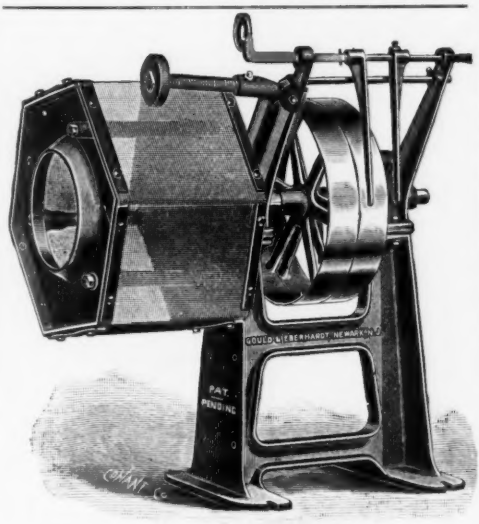

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GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

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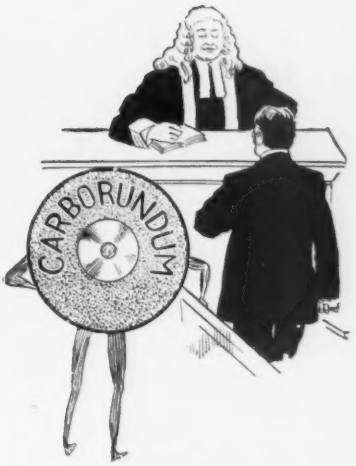

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If you can get an abrasive wheel that does twice the work of the wheel you have been using—
If, in addition, the new wheel does its work in half the time of the old one—
And then, on top of that, does cleaner, better work, it ought to be a money-saving proposition, don't you think, even though the new wheel does cost a bit more in the first place?

Let us send you the Carborundum Catalogue.

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What kind of chaplets he likes to use and he will say **Fanner's** every time.

He knows that a good chaplet will never make a bad casting. There is no blowing from **Fanner Chaplets.**

If you are making special castings let us make you special chaplets. The two go together. The right chaplet means more castings for less money.

We know how to make the right chaplet. Correspond with us and find out what we know about this subject.

...THE...

Fanner Mfg. Co.,

Brookside Park,

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Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

A Good Opportunity

for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

The business has been established since 1868 and is in a paying condition.

A full chance is offered intending purchasers to investigate. Address,

FOUNDRY AND MACHINE SHOP,
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We will make your patterns quickly and at low cost. We have a number of customers for whom we make more than one thousand dollars' ($1,000.00) worth of patterns each month. We have made eighteen thousand dollars' ($18,000.00) worth for one corporation inside of ninety days.

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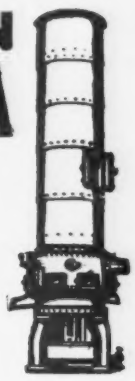

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Fuel Economy.
Rapid Melting.
Good Construction.
Ten Sizes.

This cupola represents all that is advanced in modern cupola design. It is the coming furnace. Let us quote you.

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Oliver Wood Trimmers
are absolute
Pattern Shop Requirements

Because: the Oliver Wood Trimmer enables you to handle your work in the pattern shop faster and with a degree of refinement never before attained on the 1001 little angle joints and finished wood ends going into the making of a perfect pattern.

No M. E. is required to operate the Oliver Trimmer. If the veriest "cub" in your shop could'nt do good work with it, he ought to be "fired."

The road to faster profits and better production lies thro' the use of the Oliver Wood Trimmer, and we've a book that points the direction.

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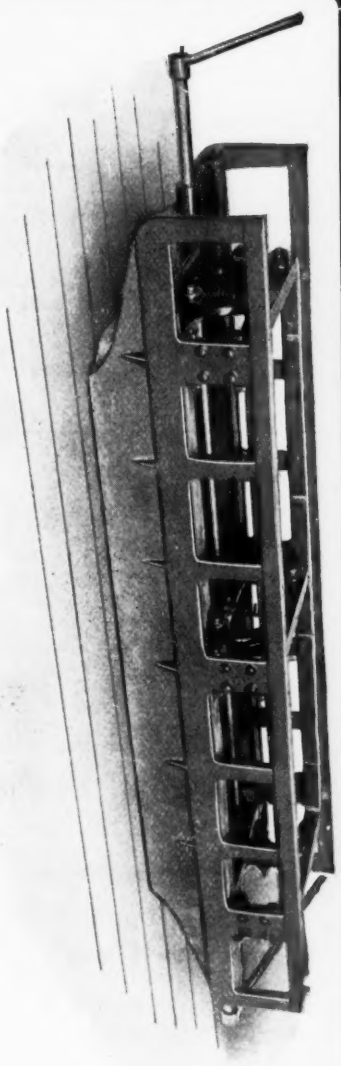

24 IN. BY 9 FT., DOUBLE SHAFT, 6 CRANK, 6 WAY MACHINE.

PRIDMORE
Molding Machines
MANUFACTURED BY
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FRESH SNOWBALLS

ALWAYS ON HAND.

The Kind That Do Not Melt.

Also, Cowen, T. Carr, M. T., and other brands of English Fire Brick.
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High Grade FIRE BRICK.

Best for Rolling Mills, Blast Furnaces, Foundries, etc. Try our Cupola Blocks and Scioto Ground Clay.

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Rises the mechanic of today who keeps himself posted. He knows more than one way of doing a job and when the opportunity comes he is ready to fill a responsible position.

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American Foundry Practice - -	$2 50
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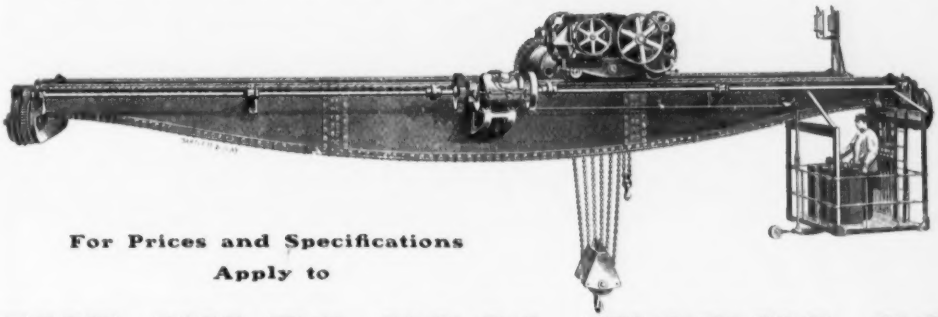
Your order for any of these will receive prompt attention.

THE FOUNDRY, Rose Bldg., CLEVELAND, OHIO.

Niles Electric Traveling Cranes

Built on the Latest and Most Improved Designs.



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HECLA GUM

pronounce it superior to all other materials for making Strong Cores.

Raps Out Easily, Makes Clean Castings, Guaranteed Not to Blow, Will Not Draw Moisture

In every respect makes a better and cheaper Core than Flour, Rosin, Molasses or any Compound on the market.

Sample barrels, 200 lbs., sent on approval.

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WE are supplying brass foundries throughout the country with our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We also carry a stock of the best makes of Crucibles at the lowest prices.

Try a small barrel of our Iron Flux at seven (7) cts. per lb. for the purifying and removing of Iron in the making of Brass Castings.

We also supply brass foundries with Scrap Metals of all kinds at the lowest market prices, put up in crucible shape, if so desired.

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"ALEXANDRIA," High Grade, Low Sulphur FURNACE and FOUNDRY COKE.

Made exclusively from washed coal. Special care taken in grading and selecting for **FOUNDRY** use.

HIGHEST QUALITY. **LOWEST PRICES.**

SATISFACTION GUARANTEED.

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Goff, Horner & Co.

PIG IRON, STEEL, COAL and COKE

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Do You Make Light or Heavy

Dry Sand and Skin Dried Work

If So, You Should Use

McCORMICK'S VULCAN BLACKING.

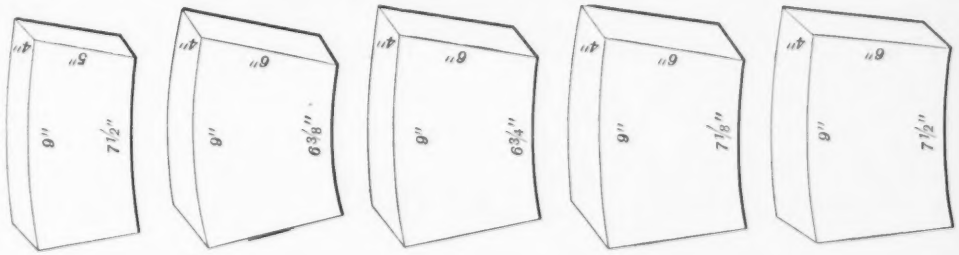
It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

MADE ONLY BY

J. S. McCORMICK CO., PITTSBURG, PA.

"Franklin Crown" and "Sligo"

MAKE THE BEST BLAST FURNACE LININGS ON EARTH.



If that is true then they must be excellent for Cupolas, Boilers, etc. We make every conceivable shape in **Fire Brick.** Our **Fire Clay** is used almost exclusively by the large Steel Companies in the west. Send us a trial order, you'll never regret it.

The Garden City Sand Co. 3 TELS. ALL M 4827. 188 Madison Street, CHICAGO.

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Hinkle and **Peninsular** are the leaders in Lake Superior Charcoal for car wheels, malleable and high grade foundry work.

Curtin, cold blast, charcoal, for chilled rolls and hammer dies.

Rome and **Cherokee** are the best brands of Southern Charcoal for sand rolls, car wheels and machinery castings.

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Alleghany, Crane, Bellefonte, Niagara, Punxy, Scottdale, Tonawanda, Victoria, Henry Clay, Macungie are some of our choice Pennsylvania, New York and Virginia brands.

Space does not permit us to enumerate the
Hanging Rock Charcoal,
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72 HOUR FOUNDRY COKE.

Best brands of Connellsville, West Virginia and Virginia Coke.

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BITUMINOUS, *or*

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Carloads and less than carloads.

Our **Larimer Plant** is situated in the center of the best Youghiogheny coal district.

Our **Larimer Plant** has the most improved machinery for manufacturing and producing the **very best Bituminous facing.**

Our **Larimer Plant** now has a capacity of **100 tons Bituminous per day.**

OUR BITUMINOUS, OR SEA COAL FACING, IS GUARANTEED TO BE GROUND MORE FINE AND UNIFORM THAN ANY OTHERS. :: :: ::

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All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

Location and area of tuyeres insure the highest melting . . . efficiency. . . . . .

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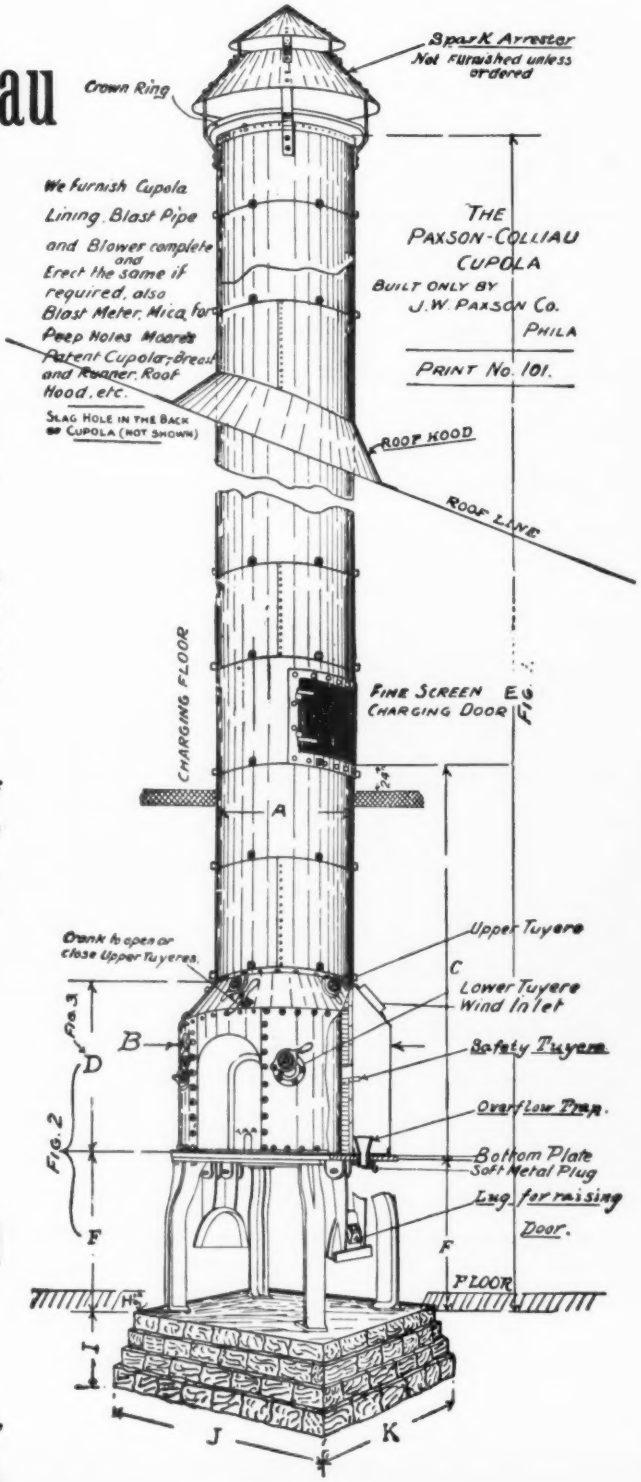
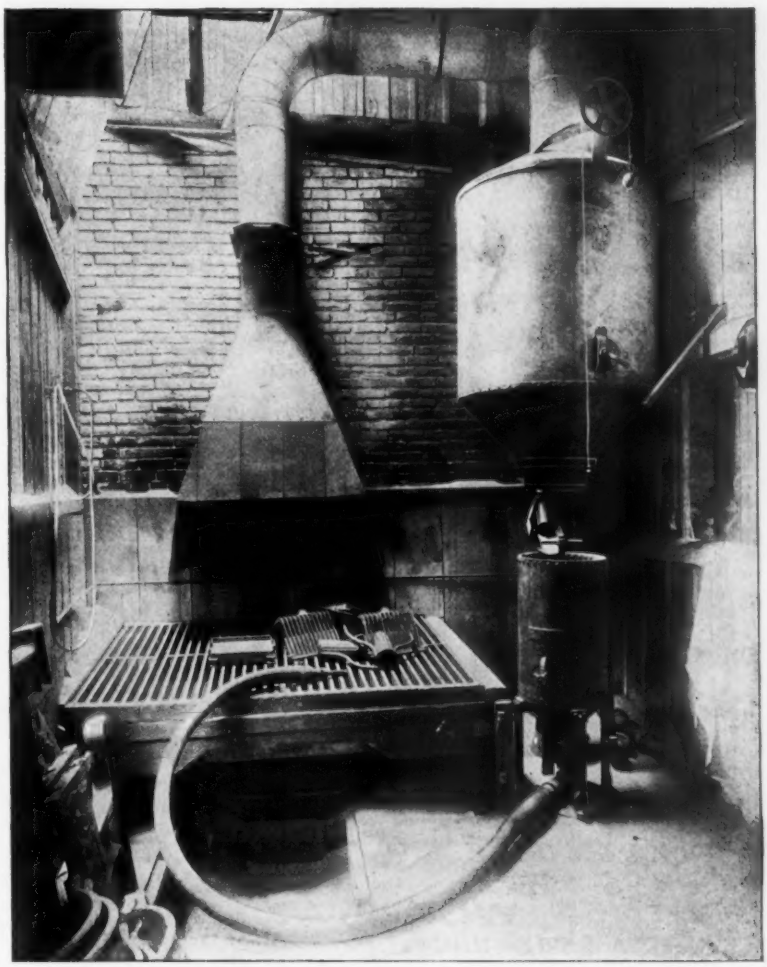


PAXSON-WARREN
SAND BLAST
AND EXHAUST SYSTEM, AND SAND BLAST TUMBLING BARRELS.

PATENTED, OTHER PATENTS PENDING.



CUT SHOWS OPERATING ROOM OF MEDIUM SIZED PLANT.

MADE IN THREE SIZES. SEND FOR DESCRIPTIVE CIRCULAR.

APPARATUS BUILT TO MEET MODERN FOUNDRY REQUIREMENTS A DEEP AND EXPENSIVE PIT IS NOT REQUIRED.

J. W. PAXSON CO. MANUFACTURERS AND SOLE AGENTS.

PHILADELPHIA, PA., U. S. A.

WHITEHEAD BROTHERS MOLDING COMPANY.

SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
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PROVIDENCE OFFICE.
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70 AND 72 COLUMBIA ST.

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CHEESEQUAKE CREEK, N. J.
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ESTABLISHED 1827. INCORPORATED 1868.

Dixon's Plumbago Crucibles

JOSEPH DIXON

Father of the Crucible industry. Inventor of Dixon's Black-Lead Crucible, Dixon's "Carburet of Iron" Stove Polish, etc., and founder of Joseph Dixon Crucible Co.

Joseph Dixon originated the Dixon Crucible in 1826.

This makes 75 years of conservative and successful business.

This Dixon Crucible invention revolutionized the metal melting industry.

To-day Dixon Crucibles are more sold and used than all other kinds.

Chemical analysis of material is made every day.

Only the best materials are used and the whole shop is under expert practical management.

As a result Dixon Crucibles run the most heats, take the least fuel, and the remark is universal both abroad as well as in the United States, that the Dixon Crucible is the standard, the best and the most economical.

Have you ever read our treatise on crucibles? How made and how to use them? Copy free if you would like it.

Joseph Dixon Crucible Co.

JERSEY CITY, NEW JERSEY

The J. D. Smith Foundry Supply Company

Operating the

CLEVELAND FACING MILL,

Manufacture

FOUNDRY FACINGS
FOUNDRY BLACKINGS
FOUNDRY SUPPLIES
FOUNDRY EQUIPMENT

Buy and Sell

Second-Hand Foundry Equipment.

(Cupolas, Blowers, Cranes, Ladles, etc. Send for List.)

WANTED: One Second-Hand 8-Ton Crane Ladle.

Our Special Brands:

X PLUMBAGO, RADIANT FACINGS,
A. A. PLUMBAGO, FAVORITE STOVE PLATE,
CORONA PLUMBAGO, EXCELSIOR RETURN,
C. F. M. FOUNDER'S PERFECT WASH.

The J. D. Smith Foundry Supply Company

F. H. CHAMBERLIN, Pres.
J. D. SMITH, Sec'y and Treas.

40 South Water Street,
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MILLS: { Cleveland Facing Mill, Cleveland, O.
{ Queen City Facing Mill, Cincinnati, O.

SUPPLIES AND EQUIPMENTS. THE FOUNDRY STORE, 40 South Water Street.

What This Modern Foundry Tool Will Do.

Some of the most wonderful labor-saving air tools made are our Pneumatic Hand or Crane Rammers. These are some of their strong points:

1. They do the work of four to fifteen men.

2. They ram a flask much more evenly—there is much less chance of bad castings.

3. They work evenly—strike a uniform blow, and 250 to 300 of them a minute.

Have you ever tried pneumatic rammers? Why not?

Ten days' free trial if you say so.

PHILADELPHIA PNEUMATIC TOOL CO.

PHILADELPHIA. NEW YORK. PITTSBURGH.

CORCORAN ART GALLERY, Washington, D. C.

Structural Steel

Furnished and Erected by the

American Bridge Company

GENERAL OFFICES 100 BROADWAY NEW YORK

Structural Steel and Iron

ENGINEERS, MANUFACTURERS and CONTRACTORS
FOR BUILDINGS, ROOFS, BRIDGES and ALL CLASSES of
METALLIC STRUCTURES

Branch Offices throughout the Country. European Office: LONDON

LILLBRIDGE, N. Y., 21-81.

Good Stuff Counts

It is the quality of the goods we sell which is giving us our reputation for fair dealing. Our age and greatness cuts no figure.

There are older people in the foundry supply business, but there are none who can give you better service than ourselves.

Our plant is the most modern in the country. It is large enough to take care of any order you may send us.

We shall be glad to be of use to the foundrymen at large. We aim to treat everybody right, no matter where they purchase their foundry supplies.

All communications have immediate and careful attention. Write us on any subject connected with the trade.

THE HILL & GRIFFITH CO.

Cincinnati, Ohio, U. S. A.

Importers and Refiners of Graphite and Ceylon Plumbago for all purposes.

Foundry Facings, Supplies and Complete Equipments.

It's Time to See Ayers

Your stock of molding sand is running low. While you are buying sand, buy the best. That means *Ayers'*.

It does not pay to use inferior molding sand. The extra time consumed by the molders and its short life makes it very expensive stuff.

The *choicest molding sand in the world* is that shipped by *Ayers of Zanesville, Ohio.* Do not forget the name *Ayers* when you specify *Zanesville* sand, that is if you want the *real Zanesville.* Nobody has it but *Ayers.*

Let us have your orders early. There is going to be a rush this year.

E. M. Ayers, Zanesville, Ohio.

M. M. COCHRAN, PRES.
W. HARRY BROWN, V.-PRES.

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WASHINGTON COAL & COKE CO.

5000 TONS DAILY CAPACITY
INDIVIDUAL CARS.

YOUGHIOGHENY .. COAL ..	WASHINGTON .. COKE ..
STEAM, GAS, COKING.	FURNACE, FOUNDRY, CRUSHED.

SHIPMENTS VIA B. O. R. R., and P. & L. E. R. R. and CONNECTIONS.

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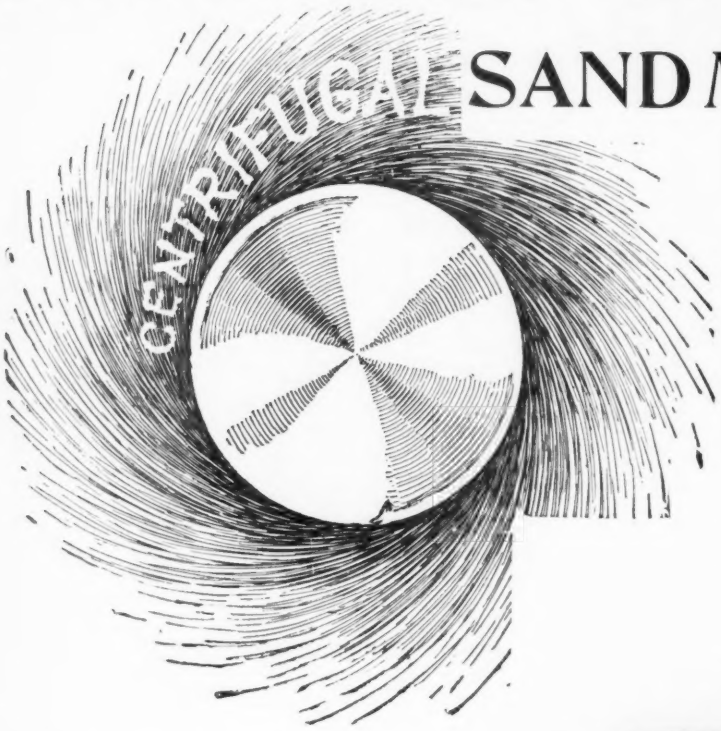
MODERN FOUNDRY MACHINERY



SAND MIXER

Not an Experiment

PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand,** we have issued a small pamphlet which will be sent on application.

Among late Purchasers are:

American Radiator Co., Buffalo, N. Y.
American Radiator Co., Titusville, Pa.
National Malleable Castings Co., Indianapolis, Ind.
National Malleable Castings Co., Cleveland, Ohio.
Fischer Foundry & Machine Co., Pittsburg, Pa.
R. Hoe & Co., New York.
U. S. Arsenal, Rock Island, Ill.
Michigan Malleable Iron Co., Detroit, Mich.
New York Air Brake Co., Watertown, N. Y.
Norfolk & Western R. R., Roanoke, Va.
And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence is Solicited.

"THE WELLS LIGHT" REG

WALLWORK & WELLS' PATENTS

Over 16,000 in Use.

ALWAYS READY!

800 TO 4,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to all Railroads and Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y and Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G CO.,

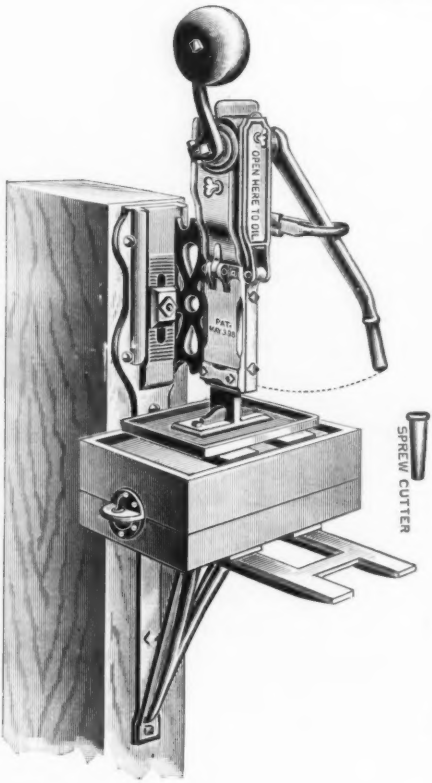
EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts.

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

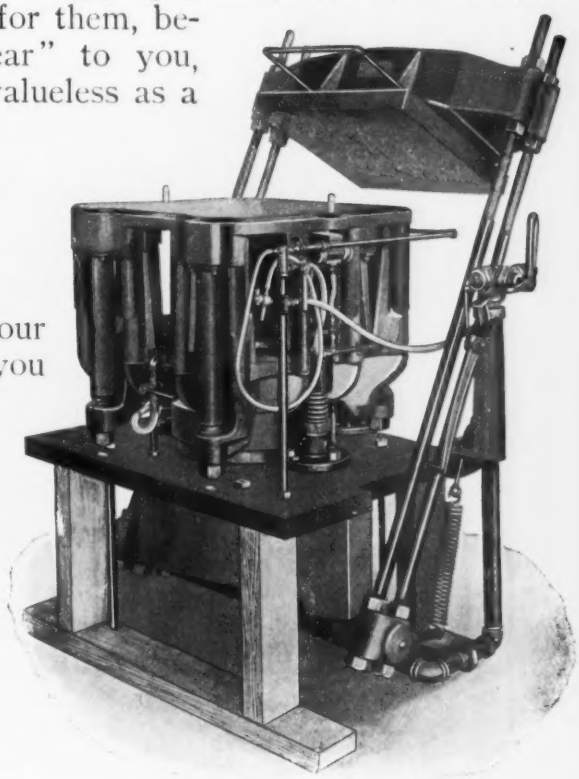
SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

J. W. JACKMAN & CO.
Sole European Representatives, London, S. W., Eng.

TABOR MOLDING MACHINES

If you want Power Ramming Molding Machines—machines which do all the work except putting in the sand, setting the cores, and pouring the metal—and if you are not fond of filling catacombs full of expensive stripping plate patterns, which you keep, once you have paid for them, because they were so "dear" to you, though they may be as valueless as a departed mother-in-law,



BUY TABOR MACHINES

If you just want to use your wooden patterns quickly, you can stick them on our Paraffined Wooden Plates, and draw them with our Vibrator, if you

BUY THE TABOR

If you have a lot of gated patterns, which hand-rapping is continually knocking to pieces, you can save pattern repairs and get to machine molding of the highest class, by using our Vibrator Frame system, so

BUY A TABOR

Write us for the latest truths about Machine Molding.

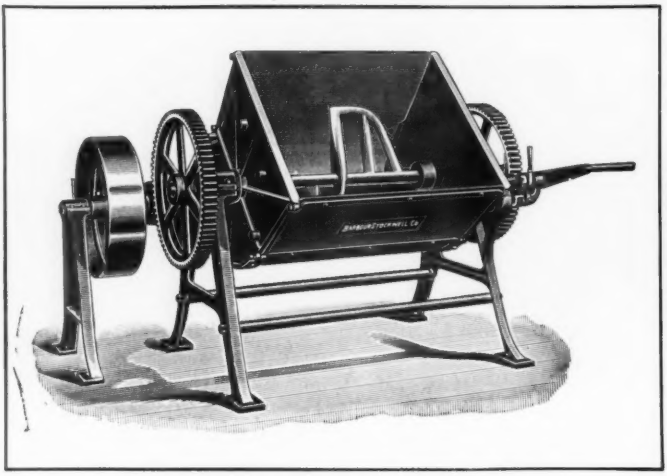
The Tabor Manufacturing Co.

18th & Hamilton Sts., Philadelphia.

JAMES HARTLEY & CO. OF MANCHESTER, LTD.,
38 Victoria Bldgs., London, England.

SCHUCHARDT & SCHUTTE,
Berlin, Vienna, Brussels, St. Petersburg.

Boston Foundry Mixer.



DRIVEN BY BELT OR BY MOTOR.

By its use you have a better mixed core-sand and facing at one-half the cost of that mixed by the old methods.

This Mixer is in use in many of the largest Foundries in the United States.

On Exhibition and For Sale by . . .

THE S. OBERMAYER COMPANY,

18th and Rockwell Streets, CHICAGO, ILL.

FOR PARTICULARS REGARDING OUR MIXER AND SAND SIFTERS, WRITE

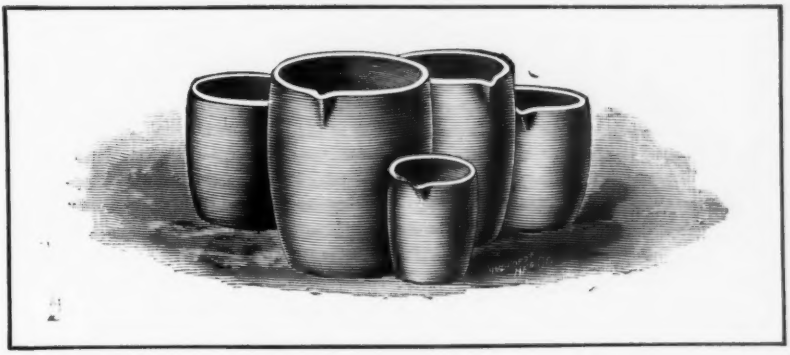
BARBOUR-STOCKWELL CO.

205 Broadway, CAMBRIDGEPORT, MASS.

BRIDGEPORT CRUCIBLE CO.

MANUFACTURERS OF

BLACK LEAD CRUCIBLES



CLIMAX FURNACE CLAY

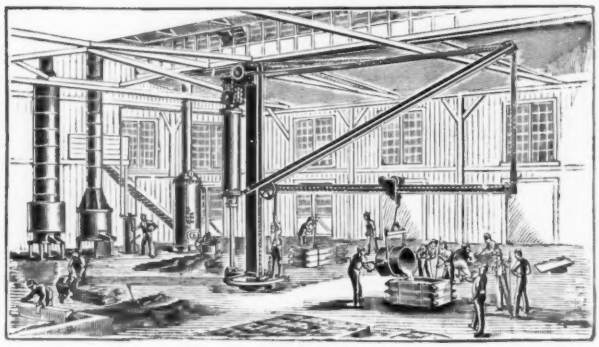
A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U.S.A.

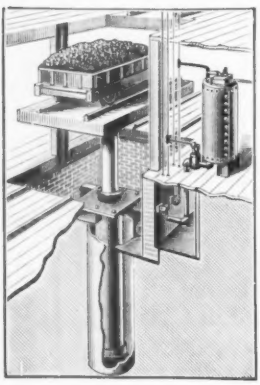
"Hitch 'er to the Biler."

THE Steam-Hydraulic system of cranes and elevators as developed and perfected by the Ridgways is just what is wanted in thousands of places. It is cheap to install, costs nothing to maintain and is absolutely perfect in performance.

For swing Cranes nothing has been found to approach the Ridgway Cranes. They are used in large numbers in mills and foundries because they are so easy to install and are so perfect in action.



5-Ton Steam Hydraulic Crane in a Foundry.



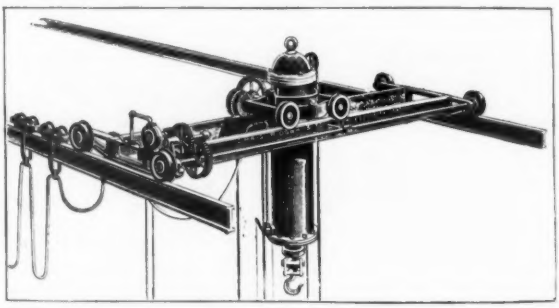
In foundries, those who use them say the same molders will do fifty per cent. more work for the same wages under Ridgway Cranes than under other cranes. This is due not so much to its speed as to its peculiar motion in drawing patterns, lifting copes, etc., avoiding tear ups and mending.

We use one Steam-Hydraulic system for all kinds of devices, and we will be glad to name prices any time.

Of course Compressed Air can be used instead of steam if desired, but steam is always the best and cheapest and most reliable. Nothing stops a steam Hydraulic machine but a boiler explosion.

Oil Governed Air Hoists.

Everybody who knows these hoists gets them, because they are good. A little oil governs them, and there is no danger of killing anybody if something slips or goes wrong. Don't cost much more than other hoists but worth the difference many times over. The only safe hoist for a foundry. Can lift and handle most delicate work.



"Please Take the Elevator."

Let your boiler lift the stuff. Don't cost as much as a good pump and yet is the finest of hydraulic elevators.

CRAIG RIDGWAY & SON CO.,

COATESVILLE, PA.

European Agt., CHAS. G. ECKSTEIN, 16 Spandauerstr., BERLIN, GERMANY.

Roots' Positive Pressure Blower

ALWAYS THE STANDARD

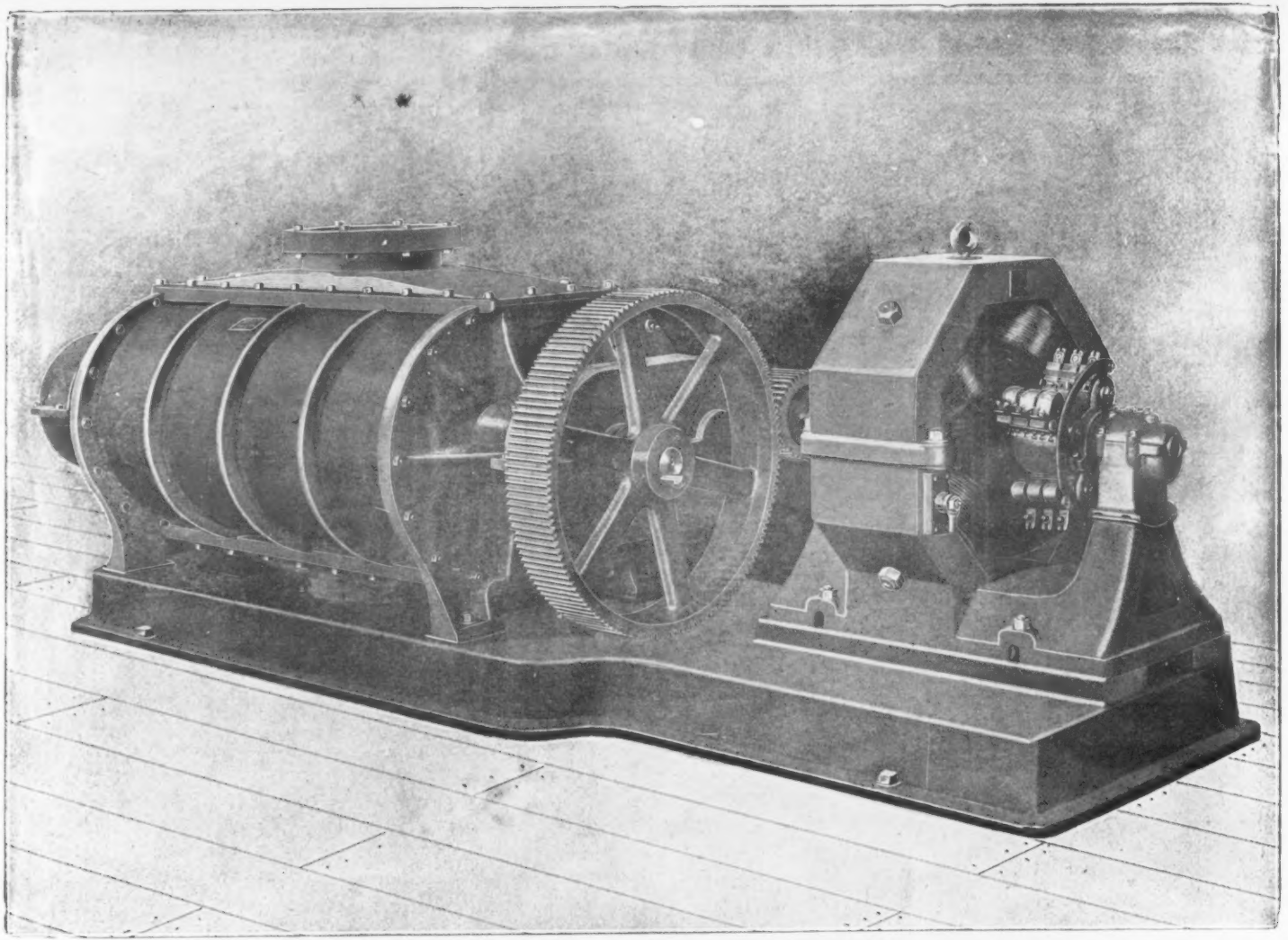
Established 1859.

The ROOTS obtains the minimum of friction and the maximum of efficiency
Others cannot—do not

P. H. & F. M. ROOTS CO.

HOME OFFICE AND WORKS,
CONNERSVILLE, INDIANA, U. S. A.

NEW YORK OFFICE, 109 Liberty Street.
CHICAGO OFFICE, 1538 Marquette Building.
PITTSBURG OFFICE, F. R. Dravo & Co., 812 Lewis Block.
CLEVELAND OFFICE, F. R. Dravo & Co., 707 New England Building.



ROOTS BLOWER GEARED DIRECT TO ELECTRIC ARTIST.

OUR COMMERCIAL TOURIST

REPRESENTING

The entire Ohio Valley product of MOLDING SAND Superior to any for wear and surface, and the largest body of Molding Sand under one control, together with 6,300 feet of railway siding, making an unlimited capacity.

MASTER VAN DYE

Molding Sand not equaled for Stove Plate, Hardware, Malleable or Grey Iron, light, medium, or heavy. Agricultural work, fine Brass and Core Sand, all of which are fully guaranteed as above.

Standard Molding Sand

IN USE FOR FIFTY YEARS

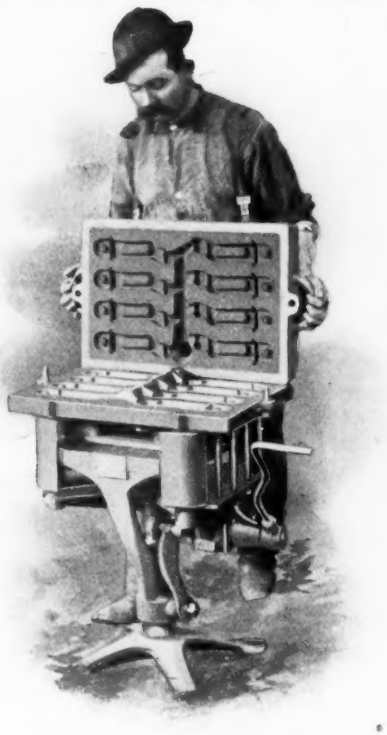
OUR Specialties are: No. 5 and No. 6 Newport, fine; No. 5 Indiana, strong and fine; No. 2 Indiana, red floor sand, and New Albany, medium fine. Having absolute control of every variety we represent, being 15 distinct and superior sands, we can satisfy the most skeptical user.

The Newport Sand Bank Co., NEWPORT, KY.

We own ALL of the FAMOUS NEWPORT SAND and are the ONLY SHIPPERS of same.
The BILLING will show DECEPTION of IMITATORS.

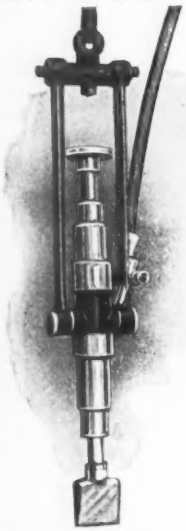
Where is the loss of time

in molding? In ramming? No. In venting? No. In shaking out? No. It is in drawing the pattern, and the loss increases as the casting becomes more complicated. Watch any molder, and, unless his job be one of the plainest kinds, he will not only spend a great part of his time in rapping the pattern and drawing it out of the mold, but he will spend still more time patching the mold.



A Maywood Molding Machine.

In the **MAYWOOD MOLDING MACHINE** the pattern is so arranged that a simple movement of a lever frees it from the mold in the fraction of a second. There is no tearing of the sand, and consequently no patching to be done. Nothing but a perfect mold can be made.



To shops who are tired of paying a skilled mechanic to wear himself out pounding sand we offer the **MAYWOOD PNEUMATIC RAMMER.**

The molder has the same control of this rammer as he has of any ordinary floor rammer. The advantage is that he can ram up many more molds. Compressed air does the work. His muscle is saved and he is in better shape to finish his molds.

Give us a chance to figure on some of your steady jobs.

Maywood Foundry & Machine Co.

MAYWOOD, ILLINOIS, U. S. A.

If Your Profits are Too Large

KEEP right on running your shop the way you are now.

Don't make any improvements in your foundry equipment. Don't do anything which will tend to give your workmen a chance to turn out more work.

Let them keep on moving stuff from one end of the shop to the other by main strength and awkwardness. If they stand idle part of the time, say nothing. It is your own fault.

You have probably noticed that nearly every modern foundry is putting in a trolley track. These are to carry loads of light and medium weight, sand, flasks, castings, and the like. They will also distribute iron to the side floors.

Heavy cranes are all right for heavy work, but too expensive to wear out in galloping up and down the shop.

The trolley track is the only apparatus to use where quick handling of material is necessary. It costs but little to install, nothing to keep in operation.

Let us figure out what it will cost to put your shop into a money-making condition. A simple sketch of the general plan on which your shop is laid out will have careful attention.

Coburn Trolley Track Mfg. Co.,

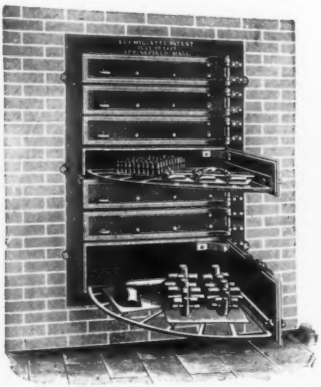
HOLYOKE, MASS., U. S. A.

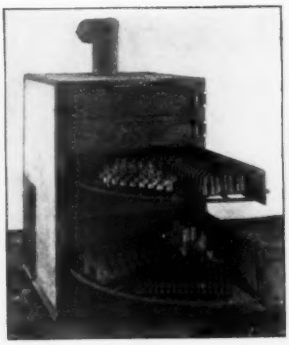
You can't do good work

with a poor machine. Neither can you make a good core without a perfect core oven.

The man who tries to bake his small cores in the same oven he uses for molds and heavy cores can not obtain the best results.

By putting in a **MILLETT CORE OVEN** he can have his cores ready at any hour of the day, and a hurried job need never worry him.





For shops doing light work exclusively we manufacture a portable oven, which is ready to bake cores the minute it gets into the shop. It is the handiest thing to put in a corner of your light work floors for small cores.

The largest size of our ovens is built into the wall as shown above. It will last a lifetime and is something you should have in your foundry if you intend to stay in business.

Millet Core Oven Co.,

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at { THE S. OBERMAYER CO., Cincinnati and Chicago.
and for sale by { THE J. W. PAXSON CO., Philadelphia.
J. W. JACKMAN & CO., 39 Victoria St., London, S. W., England.

The Most Reliable Foundry Iron Made

THAT is a great deal to say but we have the facts to back it up in **Cherry Valley Iron.**

The ores we use are selected with the utmost care. We never run short of inspected material. We couldn't afford to.

We manufacture our own coke. Its uniformity and freedom from sulphur helps us to make the **Cherry Valley Iron** uniform also.

We make nothing but foundry iron. When a foundryman receives a carload of **Cherry Valley Iron** he may rest assured that it is all of one grade.

There are shops who have used **Cherry Valley Iron** for twenty-five years. They still use it. That is a pretty good recommendation, is it not?

May we not have a chance to number you among our customers? If you have particular work to do, castings which must be strong and soft, you can order a carload of **Cherry Valley Iron** none too soon.

The Cherry Valley Iron Co.

MURTLAND BUILDING, PITTSBURG, PA.

You Know How It Goes

WHEN you are in a hurry for a casting, when everything is being rushed to get a mold ready before the bottom is dropped, you know just how things happen.

A little sand may drop into a flange, the cores may not have been as dry as they ought to have been, the iron boils, and in the morning when your customer comes around for this much hurried job you have to tell him that it is not quite perfect.

This kind 'o makes it look as if you didn't understand the foundry business. Now, if you had provided yourself with a can of ***"SMOOTH-ON CASTINGS,"*** as your neighbor did a long time ago, you would not have had to offer any excuse for that casting

Instead, you would have taken a little ***SMOOTH-ON*** and with this preparation filled the hole in the flange. If the casting appeared porous where the iron boiled from a wet core you would have put a little ***SMOOTH-ON*** there too. When your customer came you would have to offer no explanation, because the casting would in appearance and everything else be as good as if it had been perfect in the first place.

SMOOTH-ON
TRADE MARK

is our trade-mark, and you should see that this appears on the can, as otherwise you may be buying some cheap filler, which will get you into trouble later on.

If in need of Chemical advice or Chemical Analyses, we can assist you. Write for our catalogue giving prices for different Analyses.

SMOOTH-ON MFG. CO.,

ANALYTICAL AND MANUFACTURING CHEMISTS,

547-549 Communipaw Avenue. JERSEY CITY, N. J., U. S. A.

VREELAND TOMPKINS, Chemist and Manager.

I Challenge the World

to produce a separator which will save as much metal, either iron or brass, as my patent Water Cinder Mill.

A year and a half ago I sold a mill to the Rock Island Plow Co., Rock Island, Ill. Along came a fellow with one of those magnetic machines. I asked the manager of the Rock Island Plow Co. to let the other fellow put in his machine against mine, when he could keep the one which gave the best results. The challenge stood for one year. The promoter of the magnetic machine preferred conquest unfrought with danger.

I challenge the maker of any machine to a contest with my patent Water Cinder Mill for one year's steady work.

Please note testimonial below showing just what my mills will do and the cost of operating same.

I shall be glad to send you further particulars upon request.

W. W. SLY,
110 Elm Street, Cleveland, O.

ROBERT C. SCHENCK President. THOMAS P. GADDIS, Vice President. W. B. EARNSHAW, Secretary.

The Dayton Malleable Iron Co.

ALL AGREEMENTS CONTINGENT UPON STRIKES, ACCIDENTS, OR OTHER CAUSES BEYOND OUR CONTROL.

DAYTON, OHIO.

CABLE ADDRESS DAMICO. LONG DISTANCE TELEPHONE NUMBER 191.

February 15th, 1901.

Mr. W. W. Sly,

Cleveland, O.

Dear Sir:-

We give you herewith the result of the use of your two cinder mills, to date.

Days.	Tons	Cost per ton.
24	14	$1.50
22	21	1.40
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43	35	1.47

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Thos. P. Gaddis

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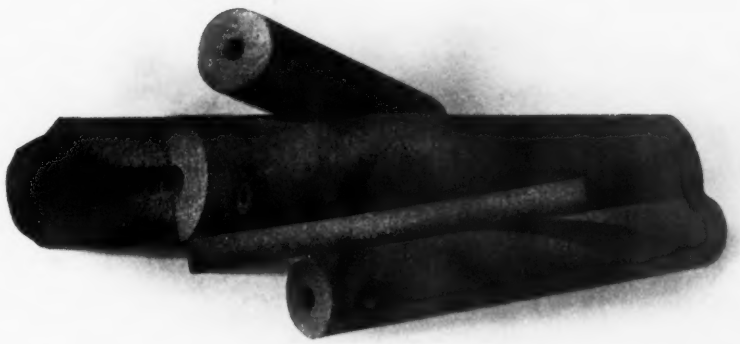

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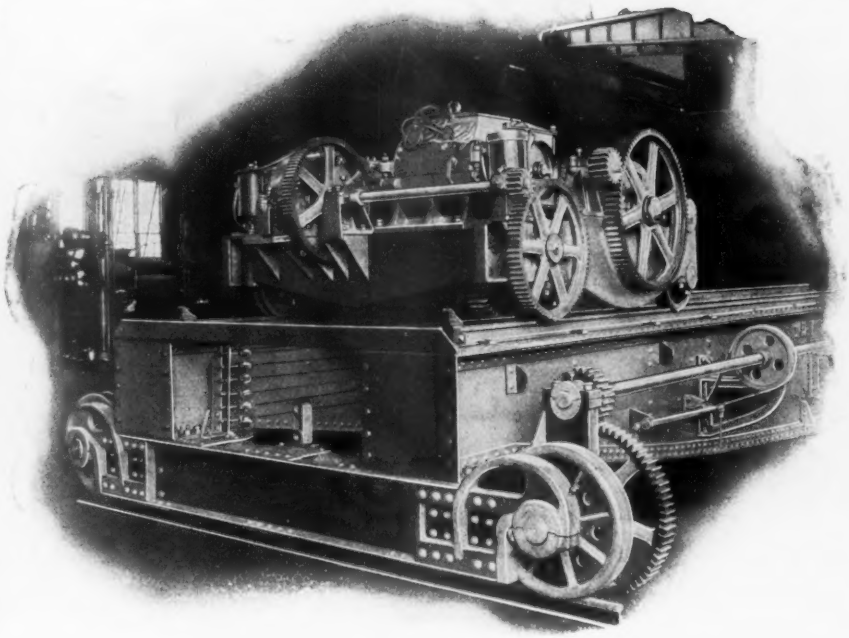

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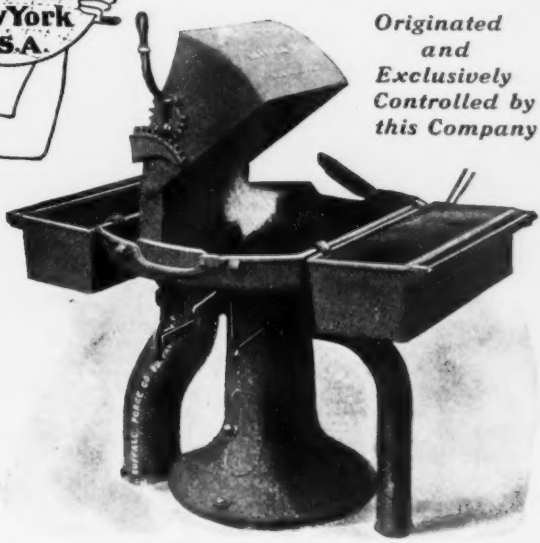

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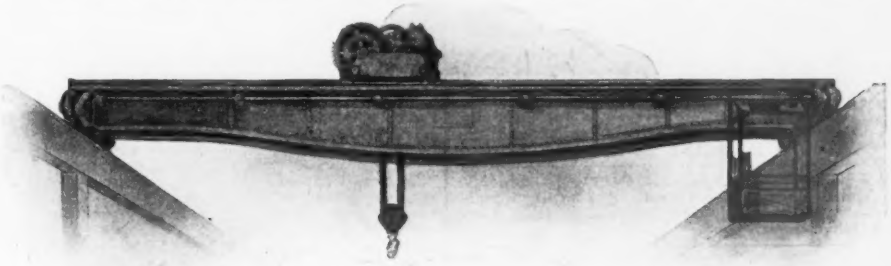

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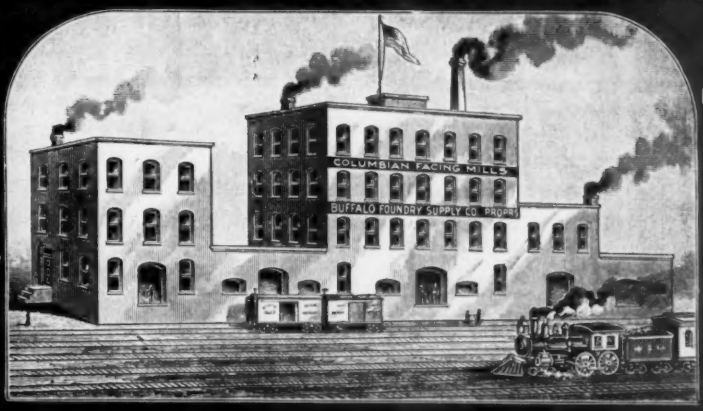

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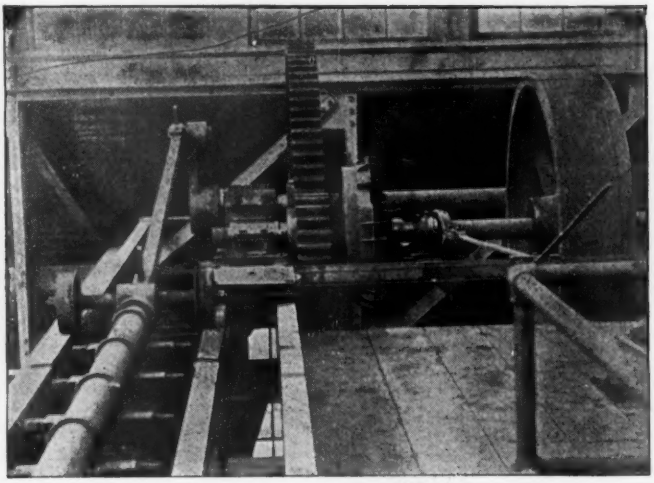

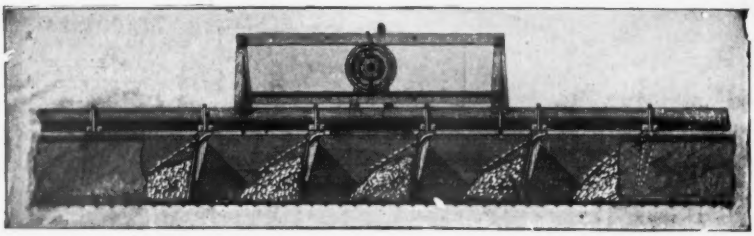

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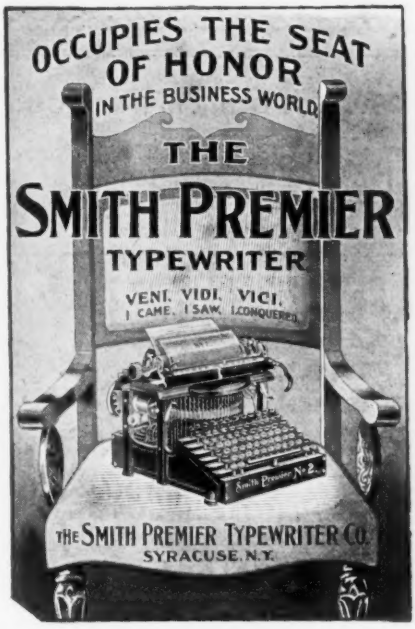

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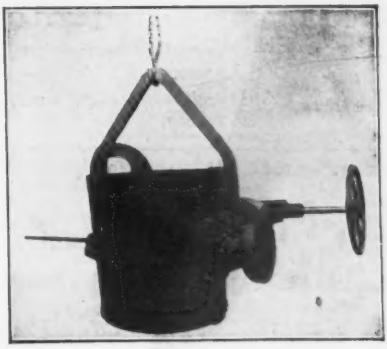

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PICKANDS, BROWN & CO.

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Foundry Flour.

We want you to use our Core Flour.
It makes a smoother and harder core. Requires only two-thirds the quantity as that of low grade flour to accomplish the same results.
Write for quotations.

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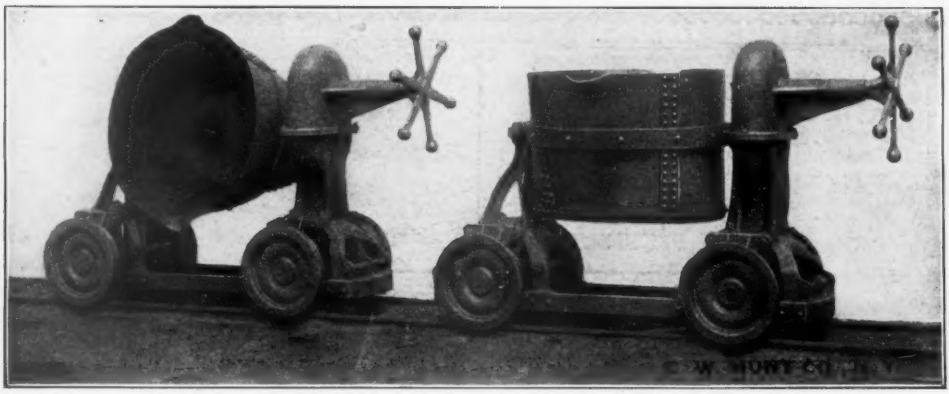

Ladle Cars, 1,500, 2,000, 3,000 Pounds Capacity.

Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 36 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

Our system of narrow-gage tracks, switches, curves, turntables, etc , for use in manufacturing establishments and to accommodate such special cars as the above, is worthy of careful investigation by those who are apt to be interested.

We shall be pleased to furnish full particulars upon application. Address the works direct.

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"OTIS" FIRE BOX PLATES A SPECIALTY.

Flange Plates, Ship Plates, Tank Plates, Steel Car Axles, and Forgings of all kinds.

Steel Castings from 100 to 75,000 lbs.

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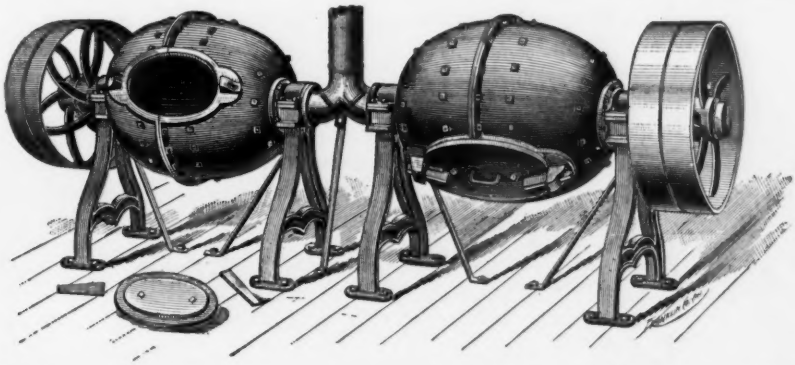
SYRACUSE STEEL FOUNDRY WHEELBARROWS

OF ALL KINDS

MANUFACTURED BY

Syracuse Chilled Plow Co.,

Write for NO. 8 F Catalogue. SYRACUSE, N. Y.



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Stover's Improved Exhaust Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other, with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days' approval to any responsible manufacturer of light castings, malleable iron, wire nails, or any other small articles that require cleaning and polishing.

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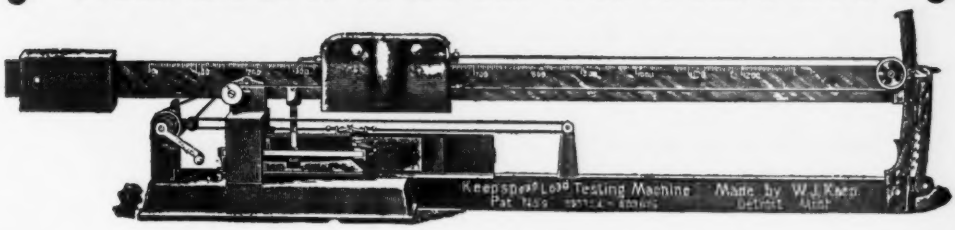

The Only Practical Method for

MAKING CASTINGS of a desired quality

AT A LOW PRICE.

Send for Testimonials and for Description of

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W. J. KEEP, Detroit, Mich.

WOOD FLASKS FOR IRON FOUNDRIES
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Best Results.

Latest Improvements.

Guaranteed Perfect.

Thousands in use Everywhere.

LATEST AND BEST PATENT IMPROVED RIBBED AND BEVELED FLASKS.

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Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

MANUFACTURERS OF

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INSPECTED FOUNDRY IRONS . . . .

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Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture?

DEAL WITH THE MANUFACTURER DIRECT.

YOUR IRON CONTRACTS

In making your contracts for 1901 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

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"ANTRIM,"
"ELK RAPIDS."

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

Superior Charcoal Iron Co.

911, 912, 913 Michigan Trust Bldg.,
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CORE COMPOUND

"ON PAROLE"

Put a 5 gallon sample can of
GLUTROSE CORE COMPOUND
in your core room
ON ITS GOOD BEHAVIOR
If you say it's all right
YOU PAY FOR IT
otherwise we lose.

When you consider the possible number of foundries that may accept this offer, you will realize that we could not afford to make it unless we had, from experience, knowledge of the value of

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AMERICAN GLUTROSE WORKS
PHILADELPHIA, PA.

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Eberhardt's Patented Sprue or Gate Cutter.

Dear Sir:—The machine fills the bill; am just delighted with it.
Yours Truly,
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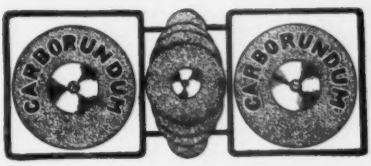

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being the hardest things on earth would make the ideal abrasives—
but diamonds are a little too expensive to use freely in the shop.

CARBORUNDUM

is the next hardest known substance, and is by all odds the best practical abrasive in the world.
It not only lasts much longer than other abrasives—
but it cuts faster while it is lasting—
and more than that—
it cuts cleaner, finishes the work better.

The illustrated catalogue tells a great deal about abrasives—
Shall we send it to you?

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Go Back!

and look over the castings you have lost. How many were thrown in the scrap heap on account of faulty chaplets?

Take the hard spots around the chaplets you are now using and the blowholes they cause, and do you not think there is room for improvement?

If you are having any trouble at all in keeping your cores in place, send us a sketch of the casting. It is likely we can help you.

Our catalogue describes our Standard Chaplets. Send for a copy.

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FANNER MFG. CO.,

Brookside Park,

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Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

A Good Opportunity

for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

The business has been established since 1868 and is in a paying condition.

A full chance is offered intending purchasers to investigate. Address,

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We will make your patterns quickly and at low cost. We have a number of customers for whom we make more than one thousand dollars' ($1,000.00) worth of patterns each month. We have made eighteen thousand dollars' ($18,000.00) worth for one corporation inside of ninety days.

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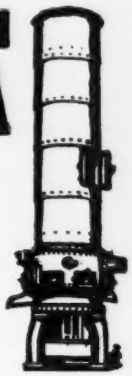

Correct Design.
Fuel Economy.
Rapid Melting.
Good Construction.
Ten Sizes.

This cupola represents all that is advanced in modern cupola design. It is the coming furnace. Let us quote you.

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Oliver Wood Trimmers
are absolute
Pattern Shop Requirements

Because: the Oliver Wood Trimmer enables you to handle your work in the pattern shop faster and with a degree of refinement never before attained on the 1001 little angle joints and finished wood ends going into the making of a perfect pattern.

No M. E. is required to operate the Oliver Trimmer. If the veriest "cub" in your shop couldn't do good work with it he ought to be "fired."

The road to faster profits and better productions lies thro' the use of the Oliver Wood Trimmer, and we've a book that points the direction.

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MOLDERS' SHOVELS
are utilized in many ways by busy workmen. Shaving the handle to a narrow edge makes a crude pean for packing the sand in the flask. This saves time for the workman, but it is tough on the shovel. The hard pean is also apt to ruin the pattern, and instead of a saving there is a constant loss. New Century and Pro-Tek-Tor shovels are equipped with our patent pean handles. To the grip is attached a metal socket containing a molded rubber pean. With it a man can work close to the side of the flask, while the pattern is protected from injury. New Century and Pro-Tek-Tor shovels hang just right for convenient and rapid work. Their use means wealth to you.
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FRESH SNOWBALLS

ALWAYS ON HAND.

The Kind That Do Not Melt.

Also, Cowen, T. Carr, M. T., and other brands of English Fire Brick.
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Also Publisher Base Ball Calendar (six months) Thirty Cents. Send your name and address and get free a circular describing Calendar, together with picture of a Sequoia Gigantea and a Fresh Snowball, the kind that does not melt. Calendar is in bright colors, especially designed for framing.

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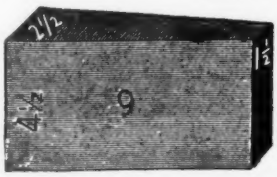
Best for Rolling Mills, Blast Furnaces, Foundries, etc. Try our Cupola Blocks and Scioto Ground Clay.



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Established 1871.

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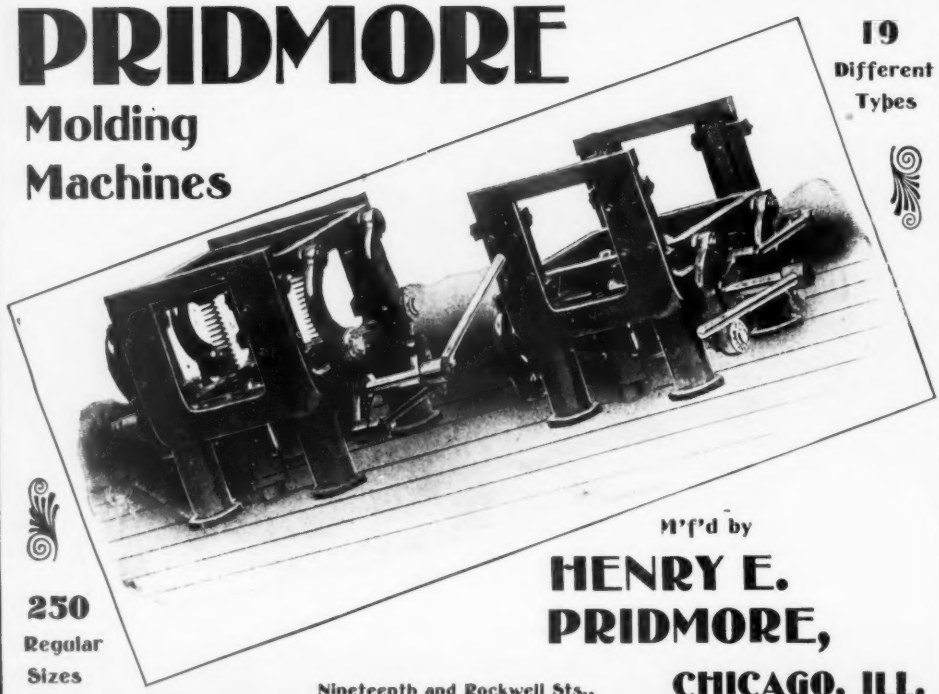
Molding Machines

19 Different Types



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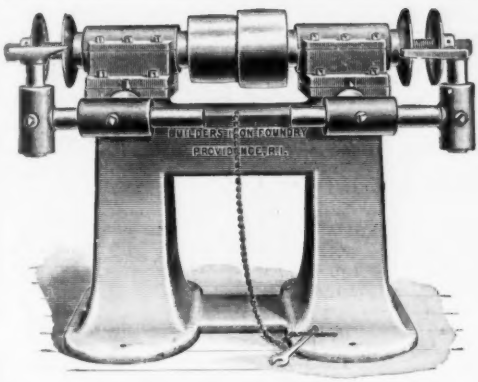

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40 inches between wheels.
Takes wheels 36 inches diameter.
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Weight about 1400 pounds.

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For removing Scale from Iron and Steel Plates, Bars, Forgings, etc., also cleaning Iron, Steel and Brass Castings

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Write for full Particulars.

WE ARE FOUNDERS, THE KEY TO PROMPT DELIVERIES.

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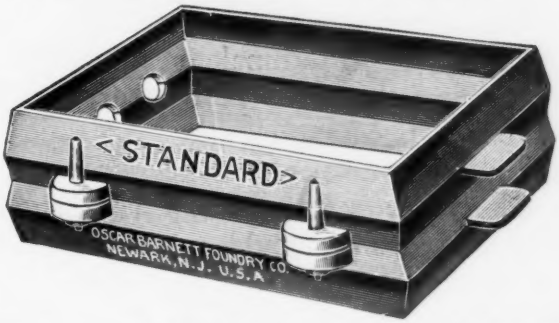

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Our Testimonial. The Oscar Barnett original **<STANDARD> BEVEL FLASK,** our product the last fifty years, requires no ribs, sales increasing yearly. Why use inferior grades? We guarantee ours! Complete Equipment Catalogue for the asking

THE PLEASURE OF SUBMITTING PRICES IS SOLICITED.

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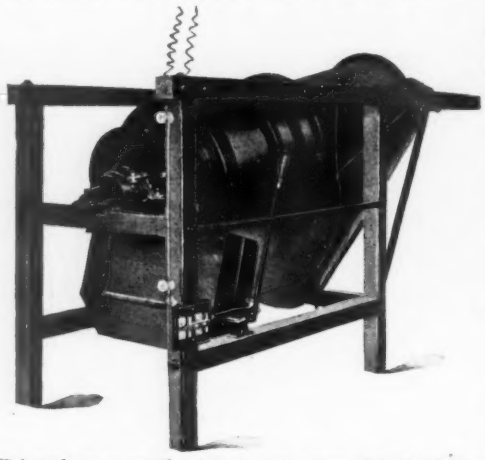

Save YOUR IRON

Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months.

EDWARD H. SLEIGHT, Prest. & Treas. HENRY H. LAGE, Secretary.

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MOLINE, ILL., Sept. 17th, 1900.

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Gentlemen:—In accordance with our contract, that in case you could show on test of your Magnetic Separator that it would net us fully 25% each year, on the investment price of $300, that we would order one, we hereby enclose order for one Magnetic Separator and have to report as follows as to result of test:

We saved up the waste from our foundry and cupola for five heats (we melting every other day or three times a week and averaging some 5,000 lbs. of iron each heat). This waste saved from the five heats weighed 8350 lbs., and on running it through your machine it separated and saved 1201 lbs. of iron.

On this showing we calculate the machine ought to net us after deducting all expenses of operating same, at least 35% each year on the cost price of $300. We consider this a strong test of the machine, as we had our cupola and other waste well picked over by hand before putting it aside for the trial test, and furthermore, before the test was made we fully believed that our waste of iron was so small that it would not warrant us to buy one of your machines at any price. Very truly yours, MOLINE PUMP COMPANY,

E. H. SLEIGHT, Prest. & Treas.

Give this machine a trial. The saving will surprise you. Write for prices and discounts.

Barnard & Leas Mfg. Co., *Mill Builders and Mill Furnishers, MOLINE, ILL.*

Whenever you are in need of a foreman, some molders, patternmakers or coremakers, you can find the right parties through THE FOUNDRY.

Possibly you need some second hand machinery, or want to swap your shop, or may be a partner would suit you. All of these things you can discover through THE FOUNDRY.

AIR COMPRESSORS FOR OPERATING

Pneumatic Chipping Hammers, Hoists, Casting Cleaners, Sand-Blast Machines, Molding Machines and other appliances in foundry work. Catalogue free.

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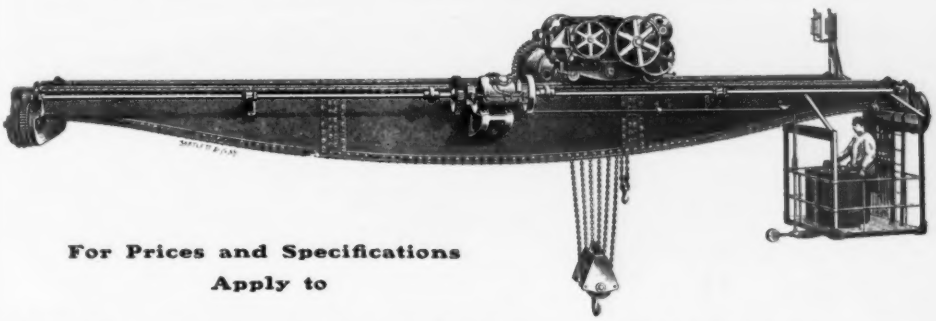
Niles Electric Traveling Cranes

Built on the Latest and Most Improved Designs.



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Every foundry in the United States, Canada, Great Britain and Australia received a copy of THE FOUNDRY during the year 1900.

Besides covering the English-speaking nations, the world's greatest consumers, shops in twenty-nine other countries received THE FOUNDRY.

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THE FOUNDRY, Cleveland, Ohio, U. S. A.

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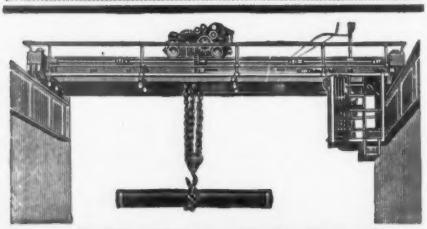

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THE CASE MFG CO
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:: JELOLUSE ::
CORE COMPOUND

A fine powder suitable for all kinds of Iron and Brass Castings, simple as flour to mix and use and raps out rapidly. :: :: ::

It is practically without smoke, odor and gas. ::

Waste sand can be used to advantage. :: :: ::

Saves Fuel.
Saves Castings.
Leaves clean surface.
Mixes easily and uniformly.

Write us for full particulars.

NATIONAL JELOLUSE CO.
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Adjustable Snap Flask Co.
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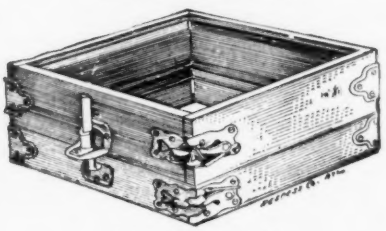

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We are prepared to furnish these flasks to the trade in all sizes. Our facilities for handling orders are the best, and we can make prompt shipments. Write us for sizes you are in need of.

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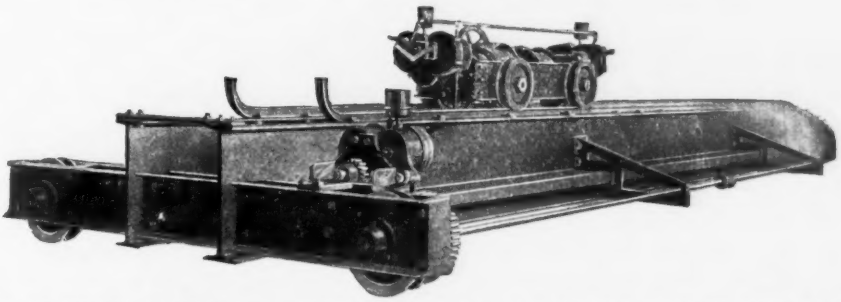
Traveling Cranes and Chain Hoists

STATIONARY PNEUMATIC MOTORS



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3,000 to 20,000 pounds capacity. Send for May Catalogue now in press.

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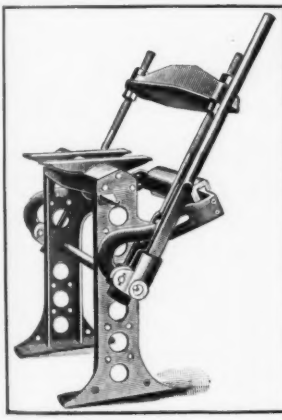

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We have been manufacturing molding machines for more than twenty-three years and **Racine** machines are acknowledged to be the most **simple, practical** and **easily operated** molding machines on the market to-day. They cost no more than inferior goods. :: :: :: :: :: :: :: ::

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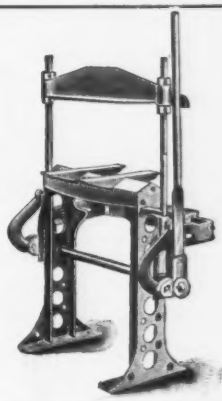

The Sixth Reader of Foundry Practice

is what Thomas D. West's "METALLURGY OF CAST IRON" might properly be called. The study of this book will broaden the foundryman's mind and show him the way to keep up with modern practice. It contains 583 pages and 107 illustrations. The price is $3.00, postpaid.

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SMELTERS AND REFINERS

WE are supplying brass foundries throughout the country with our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We also carry a stock of the best makes of Crucibles at the lowest prices.

Try a small barrel of our Metal Purifier at seven (7) cts. per lb. for the purifying and removing of Iron in the making of Brass Castings.

We also supply brass foundries with Scrap Metals of all kinds at the lowest market prices, put up in crucible shape, if so desired.

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"ALEXANDRIA," High Grade, Low Sulphur FURNACE and FOUNDRY COKE.

Made exclusively from washed coal. Special care taken in grading and selecting for **FOUNDRY** use.

HIGHEST QUALITY. **LOWEST PRICES.**

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Do You Make Light or Heavy

Dry Sand and Skin Dried Work

If So, You Should Use

McCORMICK'S VULCAN BLACKING.

It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

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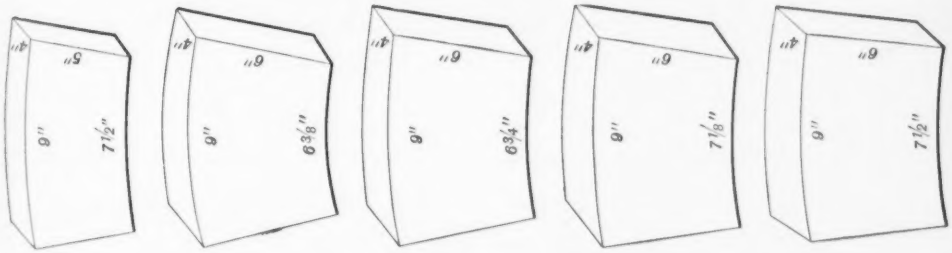
"Franklin Crown" and "Sligo"

MAKE THE BEST BLAST FURNACE LININGS ON EARTH.



If that is true then they must be excellent for Cupolas, Boilers, etc. We make every conceivable shape in **Fire Brick.** Our **Fire Clay** is used almost exclusively by the large Steel Companies in the west. Send us a trial order, you'll never regret it.

The Garden City Sand Co. 3 TELS. ALL M 4827. 188 Madison Street, CHICAGO.

Pig Iron, Coke

We would like to have consumers of

PIG IRON

remember that our facilities for supplying what is required are extraordinary. Our line embraces Bessemer, Basic and Mill, as well as Charcoal, Coke and Anthracite.

FOUNDRY IRONS OF EVERY VARIETY

The 40 brands we sell are produced by furnaces located in twelve different states, and shipped into nearly every state of the Union, into Canada and foreign markets.
Our comprehensive list enables us to provide what is needed for any class of work. We solicit correspondence as to requirements and mixtures.

GOOD COKE

is as essential as good iron to produce good castings. To afford our customers throughout the country reliable fuel, we offer best brands of Connellsville, Virginia, West Virginia and Alabama 72-hour Foundry Cokes at lowest market prices.

Rogers, Brown & Co.

CINCINNATI	BUFFALO	NEW YORK
CHICAGO	CLEVELAND	BOSTON
ST. LOUIS	BIRMINGHAM	SAN FRANCISCO

Rogers, Brown & Warner

PHILADELPHIA PITTSBURGH

When you require

PURE

East India Plumbago

India Silver Lead

Peerless Perfect Core Wash

FOR DRY SAND OR GREEN SAND MOLDS

Come to *Headquarters*

The S. Obermayer Co.

CHICAGO, ILL. CINCINNATI, O.

WE ARE the Largest Importers and Refiners of Plumbago in the United States. Our Plumbago is used on the largest and heaviest castings made in this country.

WE ALSO make the best Coke Blacking, Roll Blacking, Heavy Machinery Facing, XXX Mineral Facing, GENUINE Rhode Island Facing, Talc, Soapstone, Etc., Etc.

Brass Founders'

Supplies and Equipments

WE carry in stock, ready for immediate shipment, Melting Furnaces, Crucible Tongs and Shanks, Core Ovens, Spill Troughs, Metal Separators, Rosin Grinders, Lycapodium, Powdering Charcoal, Crucibles, Bench Rammers, Etc. In short, "Everything you need in your

Brass Foundry

The S. OBERMAYER CO.

CINCINNATI, O. CHICAGO, ILL.

Catalogue Sent on Application

The Twentieth Century Foundry Supply House

Nothing Like Promptness and Dispatch

On 10th of April last, we secured an order for a **five ton Ladle**, this was delivered (distance over eight hundred miles from our factory) paid for and in use in a foundry **within two weeks**.

Who can beat this record?

LADLES

In Stock and ready for immediate shipment from

30 to 10,000 pounds capacity.

The S. Obermayer Co.

CINCINNATI, OHIO
CHICAGO, - ILLS

Direct Telegraph and Telephone Communications to our Offices. If in a hurry use same at our expense.

Bituminous or Sea Coal Facings

CARLOADS AND LESS THAN CARLOADS

Our *Larimer Plant* is situated in the center of the best Youghiogheny coal district.

Our *Larimer Plant* has the most improved machinery for manufacturing and producing the *very best Bituminous Facings.*

Our *Larimer Plant* now has a capacity of *100 tons Bituminous per day.*

Our *Bituminous or Sea Coal Facing* is guaranteed to be ground more fine and uniform than any others.

The Largest Foundry Supply House in the World.

The Largest Importers and Refiners of *Plumbago, Silver Lead, Graphite.*

ALL ORDERS NOW SHIPPED VERY PROMPTLY

The S. Obermayer Co.

Factories:
Cincinnati, . . . Ohio
Chicago, . . . Illinois
Larimer, Pennsylvania

Main Offices:
CINCINNATI
OHIO

FROM THE QUAKER CITY

Sea Coal and Bitumen

These mills are at mouth of coal mines — **IRWIN**, Westmoreland Co., Pa. (on P. R. R. and Y. V. R. R.), and have a capacity of 4 cars per day.

This Facing contains but a small percentage of Sulphur, therefore has little tendency to make hard castings. (Every foundryman knows what effect Sulphur has on cast-iron.)

We make four grades :

"BOLTED" (Fine) for Hardware, Malleable Iron, Piano Plate, etc.
"NO. 1 BOLTED" for Radiators, small Agricultural Implements, etc.
"NO. 2 MEDIUM" for large and small Machinery, Car Wheels and general work.
"NO. 3 COARSE" for very heavy work.

FINE COKE FACING is also made at the Irwin Mills.

Our Quaker City Mills, Philadelphia, Pa., are running full time on Fine Facings, Plumbago, Core Wash, Core Compound, etc.

A full stock of these as well as Sea Coal and Bitumen Facing always on hand at Philadelphia for immediate delivery, also "Excelsior Bitumen" for Jobbing and Core work.

Jute and Paper Sacks and Barrels are used.

J. W. PAXSON CO.,
PHILADELPHIA, PA.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

Location and area of tuyeres insure the highest melting . . . efficiency. . . . . .

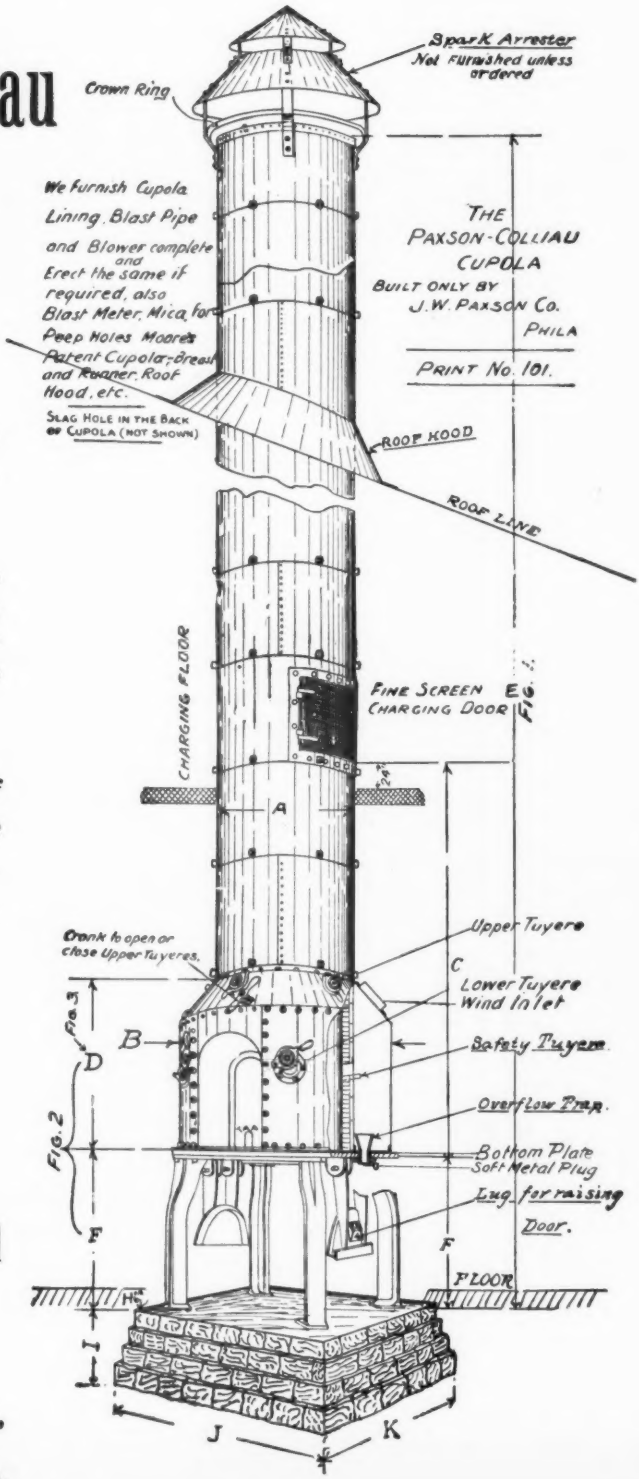
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J. W. Paxson Co.

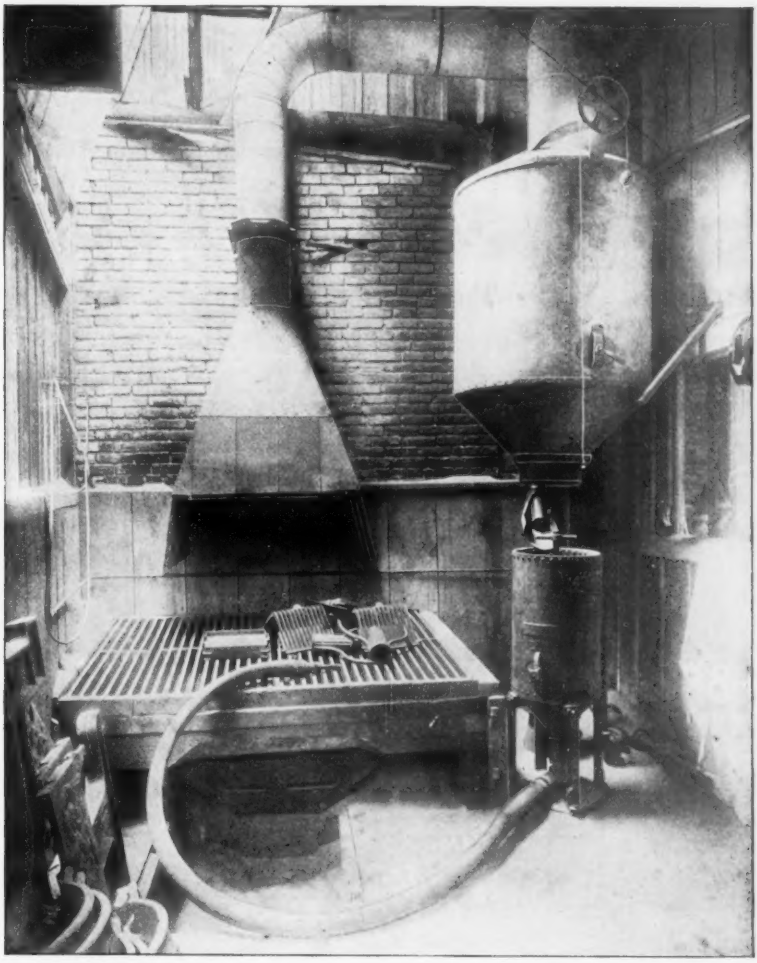
1021 . . .
North Delaware Avenue,

PHILADELPHIA, PA., U. S. A.



PAXSON-WARREN
SAND BLAST
AND EXHAUST SYSTEM, AND SAND BLAST TUMBLING BARRELS.

PATENTED, OTHER PATENTS PENDING



CUT SHOWS OPERATING ROOM OF MEDIUM SIZED PLANT.

MADE IN THREE SIZES. SEND FOR DESCRIPTIVE CIRCULAR.

APPARATUS BUILT TO MEET MODERN FOUNDRY REQUIREMENTS A DEEP AND EXPENSIVE PIT IS NOT REQUIRED.

J. W. PAXSON CO. MANUFACTURERS AND SOLE AGENTS.

PHILADELPHIA, PA., U. S. A.

WHITEHEAD BROTHERS COMPANY.

MOLDING SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
NEW YORK.

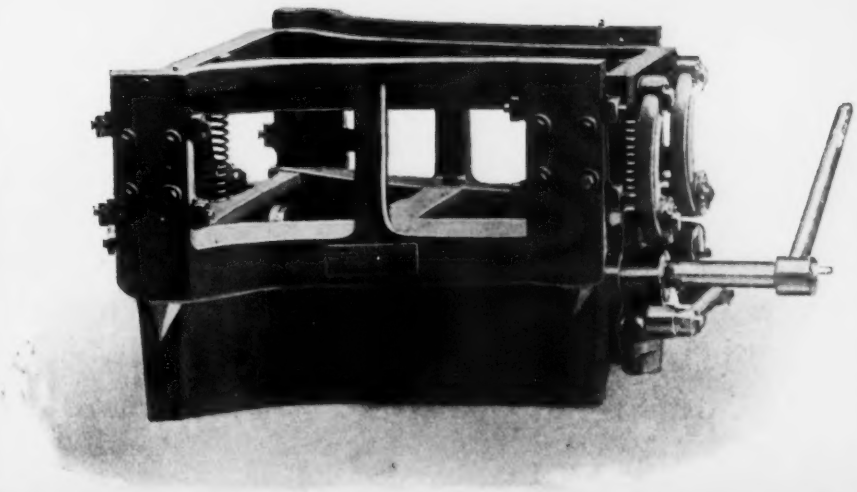
PROVIDENCE OFFICE.
42 S. WATER ST.

BUFFALO OFFICE,
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITON RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L.I.
WATERFORD, N.Y.
ALBANY, N.Y.
CEDAR HILL, N.Y.
COXSACKIE, N.Y.
CLINTON POINT, N.Y.
ATHENS, N.Y.
COEYMANS, N.Y.
WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.

PRIDMORE
MOLDING
MACHINES



19 DIFFERENT TYPES. 250 REGULAR SIZES.
SUITABLE FOR THE PRODUCTION OF
CASTINGS OF ANY SHAPE
OR WEIGHT.

HENRY E. PRIDMORE,
CHICAGO, ILL., U. S. A.

BUFFALO
FOUNDRY SUPPLY CO.

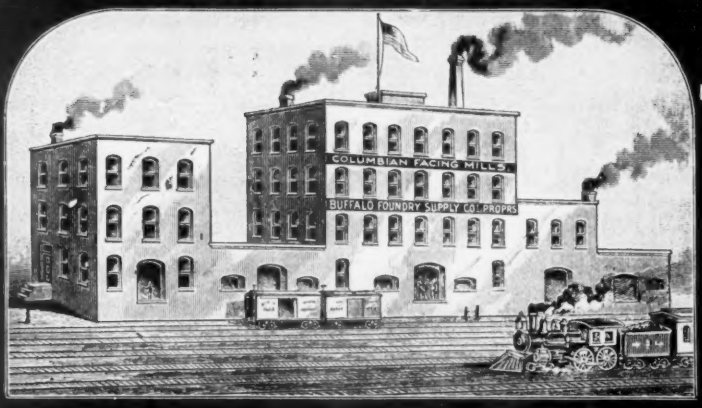
SHIPPERS OF ALL GRADES
OF
ALBANY MOULDING SAND.

FOUNDRY FACINGS AND SUPPLIES

SHIPMEMTS ON OUR OWN TRACK CONNECTS WITH SIX RAILROADS.

ALL KINDS OF GRAPHITE OR PLUMBAGO.

47 Other Facings.



Albany Moulding Sand, Core Compound, Riddles, Brushes, Shovels, Bellows, etc.

BUFFALO FOUNDRY SUPPLY CO.
BUFFALO, N. Y., U. S. A.

WE MANUFACTURE ALL KINDS OF FACINGS AND IMPORT VARIOUS KINDS OF GRAPHITE OR PLUMBAGO. THE BEST QUALITY WE OBTAIN FROM INDIA. WE SELL EVERYTHING USED IN A FOUNDRY, FROM A CUPOLA TO A MOULDER'S LIFTER OR SLICK. : : : : : : : : : : : :

J. A. HEINSHEIMER, PRESIDENT

J. S. KINGSLAND, GEN'L MGR.

Who Sells the Stove Foundries?

EVIDENCE INDISPUTABLE.

If these firms use *Kelly's Prepared Charcoal* as a return facing, with their *old* and *established heavy facing*, can *you* do better than to try it and determine for yourself whether or not it would pay you to continue its use *profitably*?

BAKER-VAWTER CO., MFRS., CHICAGO. 34207

PLEASE PUT THIS NUMBER ON YOUR INVOICE.

Detroit Stove Works,

DEPARTMENT NO. 2

ORDER NO. 1116

5/2

Detroit, Mich. _____ 190|

Messrs. J. D. Kelly & Co New York City

Please send us Via _____

TERMS DELIVERED, 60 DAYS OR 2% CASH 10TH OF MONTH FOLLOWING RECEIPT OF GOODS.

15 Tons Heavy Stove Plate Facing @ — Per Ton

F.O.B. our works,

To be shipped June 1st

Confirming Telephone Order

Please put above Order Number on your invoice.

DETROIT STOVE WORKS,

Per _____

USED BY MILLIONS
ACORN STOVES AND RANGES

Rathbone, Sard & Co.
Stove Manufacturers.
INCORPORATED 1883.

ALBANY
CHICAGO
DETROIT
AURORA.

Aurora, Ill., Apl 17 1901

Mess T P Kelly & Co
Chicaga Ill
Gentlemen. Please furnish us
1 Carload Heavy Facing
1 Sample Bbl Kelly's Prepd Charcoal
Facing
The heavy facing to be of the same
quality as furnished us the past
eleven years, at price as agreed
with your Mr Kelly
Ship ears C. B. & Q. as usual.

Yours Respy
Rathbone Sard & Co
Venn Supt

EAST INDIA LEAD

Commonly Called Silver Lead, or Plumbago

WE would remind our *patrons* and *all* foundrymen who are using this facing that we are the *only* house in our business that imports directly from Ceylon. This statement does not imply that we alone supply good black-lead facing; *but* we *do* say that our *East India Lead* is the most *uniform* and gives better satisfaction than any now offered to foundrymen.

PURCHASING DEPARTMENT
The Michigan Stove Company.

Order No. 10718 **Detroit, Mich.** April 23rd, 1901

Refer to this number in correspondence and on invoices

Ship.....

Route.....

T.P.Kelly & Co.
544 West Twenty-second St.
New York City

Please acknowledge order and promise date of Shipment.

Please enter our order as follows:

60 bbls Charcoal Facing
60 Heavy

Same quality as previous lot and at prices and terms agreed upon Ship at once via N.Y.C. and M.C.R.R.

Very truly yours,

Consignors are requested to submit invoices same day goods are shipped.

All goods are purchased subject to approval and are returnable at consignor's expense if unsatisfactory.

The Michigan Stove Co.,
E.J. Barbour
Purchasing Agent.

Wherever you see fine Stove Castings it is a ten to one shot that you will find the manufac=turers are using

KELLY'S FACINGS

THE PENINSULAR STOVE CO.

DETROIT, MICH., April 29 1901

Messrs J. P. Kelly & Co
New York City

PLEASE FURNISH THIS COMPANY WITH THE FOLLOWING MATERIAL:

Conditional that you shall undertake and agree to furnish same in full of the kinds and quality specified, and subject to our approval. To be delivered F. O. B., at Detroit and consigned to **The Peninsular Stove Company, Detroit, Michigan,** as stated below.

Delivery
August 15

1 Car load (60 Bbls) Heavy Facing
100 Bbls. Kellys prepared Charcoal Facing

Price and Quality as heretofore furnished.

Terms 2% Cash 10 days

Shipment desired via M.C.R.R.

Peninsular Stove Co
Jas. M. Dwyer

Send Bill of Lading and Invoice with goods.

The following Order Number must be on Invoice.

L 3068

10

THE FOUNDRY

IT IS SAID

An Ounce of Prevention is worth a Pound of Cure.

YET

An Ounce of SMOOTH-ON often Saves when a Pound of Prevention Fails.

Before Using SMOOTH-ON Castings

After Using SMOOTH-ON Castings

Our SMOOTH-ON Preparations

are not fillers. Each one is made for use only under certain conditions.

Our SMOOTH-ON CASTINGS is made for the special purpose of repairing castings that are leaky under pressure or having sand holes or blow holes which affect their appearance only.

SMOOTH-ON here makes a permanent repair; in fact, the appearance of the casting in color and finish is the same as if it had been perfect at the start.

We also make SMOOTH-ON for the use of engineers and plumbers in repairing steam pipes, cylinders, radiators; in fact, anything of iron which is not perfect.

Our booklet of SMOOTH-ON Compounds should interest you. Write for it.

Meanwhile send for a small can and try its contents when you have trouble. You will soon send us a larger order when you know its good qualities.

If in need of chemical advice or chemical analysis, we can assist you. Write for our catalogue giving prices for different analyses.

The Smooth-On Mfg. Co.

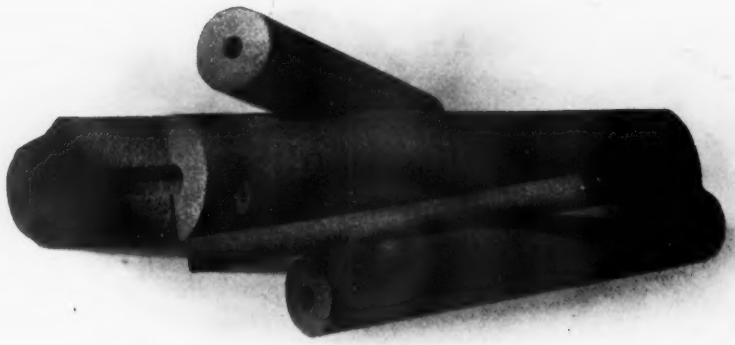
Analytical and Manufacturing Chemists,

JERSEY CITY, N. J.

The HAMMER CORE MACHINE

Makes Ten Sizes of Round Cores,
⅜, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½.

7 Feet of Perfect Core cost us (for labor) ONE CENT.



How Much Do Your Cores Cost You?

Send for Circular and Sample Core.

BROWN BROS. MFG. CO.
CHICAGO, ILL.

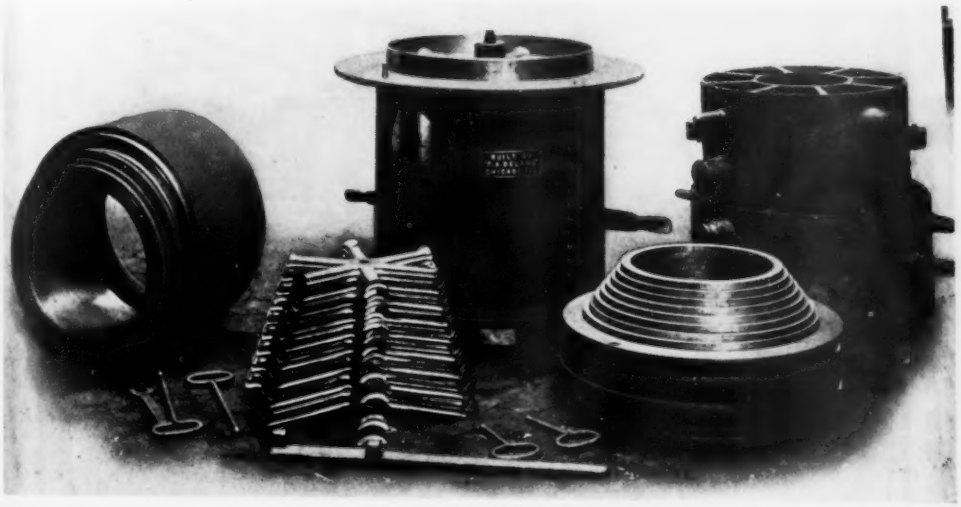
Branch Office,
N. W. Cor. Jackson Blvd. and Clinton St.

Office and Works,
22nd St. and Campbell Ave.

Pulley Moulding MACHINERY

Built by E. A. DELANO,

50 to 56 S. Clinton St., CHICAGO, ILL.



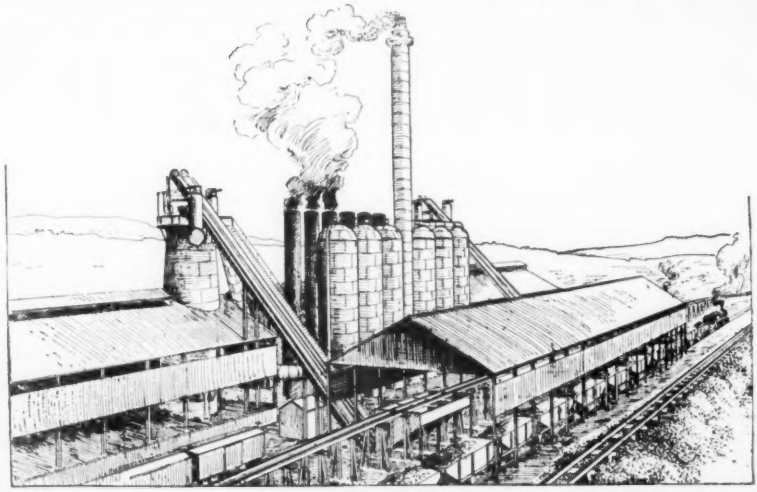
THE above cut shows our No. 2 Pulley Moulding Machine, which moulds pulleys from 16 to 24 inches diameter, using 9 rim patterns, 9 sets of inside and outside rings or stripping plates, 3 sets of arm patterns for each diameter, and 2 sample flasks, all of which outfit is shown in the cut, which is a reproduction from a photograph taken of one of these machines just previous to its shipment. We make nine sizes of machines as follows:

No. 0	Machine,	which	moulds	from	3	to 5¼	inches diameter
No. 1	"	"	"	"	6	to 15½	" "
No. 2	"	"	"	"	16	to 24½	" "
No. 3	"	"	"	"	25	to 36	" "
No. 4	"	"	"	"	37	to 48	" "
No. 5	"	"	"	"	50	to 60	" "
No. 6	"	"	"	"	62	to 72	" "
No. 5½	"	"	"	"	37	to 60	" "
No. 6½	"	"	"	"	50	to 72	" "

A few of the representative firms using these machines are as follows:

The Edward P. Allis Co., Milwaukee, Wis.
The Falls Rivet & Machine Co., Cuyahoga Falls, Ohio.
Golden's Foundry and Machine Co., Columbus, Ga.
Fraser & Chalmers, London, Eng.
Webster Mfg. Co., Chicago, Ill.
Lane Mfg. Co., Montpelier, Vt.
Baush Machine Tool Co., Springfield, Mass.
Woonsocket Machine & Press Co., Woonsocket, R. I.
Pratt & Whitney, Hartford, Conn.
Crowell Clutch & Pulley Co., Westfield, N. Y.
Meese & Gottfried, San Francisco, Cal.
Continental Gin Co., Birmingham, Ala.
H. N. Strait Mfg. Co., Kansas City, Kans.
Link Belt Machinery Co., Chicago, Ill.
Co-operative Foundry Co., Detroit, Mich.
Samuel C. Tatum, Cincinnati, Ohio.
Pyott Foundry Co., Chicago, Ill.
Wheland's Machine Works, Chattanooga, Tenn.

All users of these machines agree that they are profit makers. Are you interested?



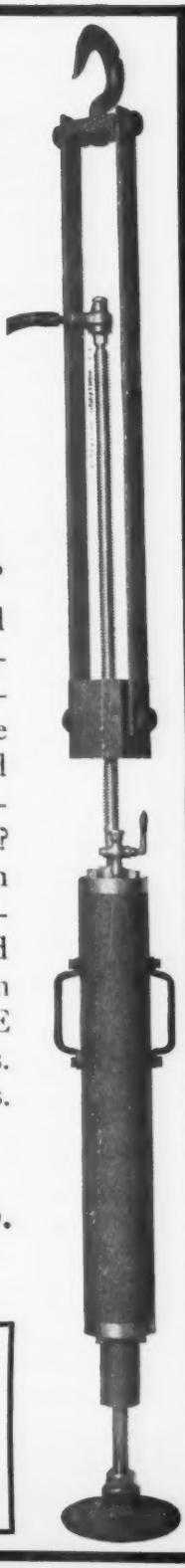
Furnaces of THE COLUMBUS IRON & STEEL CO., COLUMBUS, OHIO, manufacturers of Bessemer, Basic, Malleable, and the now famous

"BUCKEYE"

Foundry Pig Iron. Sold direct by the manufacturers. Pronounced a success by all who have tried it.

Your correspondence solicited.

THE COLUMBUS IRON & STEEL CO., COLUMBUS, OHIO. :: ::



Rapid Work in Foundries.

The foundry that uses old-time tools and methods is doomed. Our Pneumatic Chipping-Hammers do the work of three men. Our Pneumatic Rammers do the work of eight to twelve men, besides ramming the mold much harder and more evenly. All up-to-date foundries use pneumatic tools; how can others stand the competition?

But not all foundries know the difference between ordinary pneumatic tools and the *best*. In most air-tools the valves are always getting out of order and requiring repairs. In ours, the valve works on an entirely different plan. As a result, less than ONE PER CENT. of our tools come back for repairs. Keep ahead of competition by getting the *best* tools.

Send for catalogue of our Pneumatic Rammers, Chipping and Riveting Hammers, Piston Drills, Rotary Drills, etc.

Philadelphia Pneumatic Tool Co.

1038 Ridge Ave., Philadelphia.

New York. Pittsburgh.

Visitors to the Exposition at Buffalo will find an interesting display of our Pneumatic Tools for foundry work at space No. 35, Machinery and Transportation Building. The tools are shown in operation, and you can get some useful points on modern methods in chipping, ramming, etc.

TRI=STATE COAL & COKE COMPANY

Miners, Manufacturers and Shippers

CONNELLSVILLE FOUNDRY, FURNACE AND CRUSHED COKE.

DONOHOE COKE, (MADE FROM CRUSHED AND WASHED COAL)

Large Tonnage a Specialty.

Capacity over 1,000,000 Tons Coal and Coke annually.

STEAM COAL,

GAS COAL.

Ship via P. R. R., B. & O. and P. & L. E.

All Grades and Qualities.

Prompt Shipments.

Lowest Prices.

GENERAL OFFICES LEWIS BLOCK, PITTSBURG, PA.

JOSEPH DIXON

Father of the Crucible Industry, Inventor of Dixon's Black-Lead Crucible, Dixon's "Carburet of Iron" Stove Polish, etc , and founder of Joseph Dixon Crucible Co.

Established 1827 Incorporated 1868

Dixon's Plumbago Crucibles

JOSEPH DIXON originated the Dixon Crucible in 1826. This makes 75 years of conservative and successful business. This Dixon Crucible invention revolutionized the metal melting industry. To-day Dixon Crucibles are more largely sold and used than all other kinds. Chemical analysis of material is made every day. Only the best materials are used and the whole shop is under expert practical management. As a result Dixon Crucibles run the most heats, take the least fuel, and the remark is universal both abroad as well as in the United States, that the Dixon Crucible is the standard, the best and most economical. Have you ever read our treatise on crucibles? How made and how to use them? Copy free if you would like it.

Joseph Dixon Crucible Co.

JERSEY CITY, N. J., U. S. A.

Salesrooms at 68 Reade St., New York City, N. Y. 1020 Arch St., Philadelphia, Pa.
304 Market St., San Francisco, Cal. 26 Victoria St., London, Westminster, Eng.

Dixon's No. 6726
=GRAPHITE FACING=

IS what foundrymen call a "Jim Dandy" facing.

It adheres to a dryer surface and binds better than many other facings, and, therefore, has made a record with foundrymen and became a great favorite.

Let us tell you more about Dixon's Graphite Facings and Dixon's India Silver Leads.

A postal request will bring you an interesting pamphlet

Joseph Dixon Crucible Co.

JERSEY CITY, N. J. U. S. A.

Salesrooms at . . { 68 Reade Street, . . . New York City
1020 Arch Street, . Philadelphia, Pa.
304 Market Street, San Francisco, Cal.

London Office, . . 26 Victoria Street, . . . Westminster

"Some must LEAD, others FOLLOW"

Our new **ALBANY** Sand **LEADS** = All others TRY TO FOLLOW but they **CAN'T**

THE LEADER. Why is it?

BECAUSE STOVE MANUFACTURERS RECOGNIZE it to be the BEST STOVE PLATE SAND on the MARKET.

BECAUSE the MALLEABLE Trade will USE NO OTHER after they have USED IT.

BECAUSE MANUFACTURERS of RADIATORS have found it to be JUST THE THING, and for SNAP WORK, AGRICULTURAL IMPLEMENTS, etc., IT EXCELS ALL OTHERS.

MASTER VAN DYE,
OUR COMMERCIAL TOURIST,
SAYS

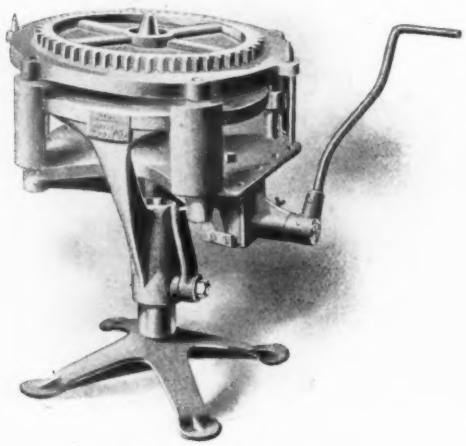
To use new ALBANY Sand is THE KEY to SUCCESS to ALL FOUNDRYMEN :: :: :: :: ::
"NONE SUCH CASTINGS LIKE OURS" is the result. It WEARS LONGER and makes FINER SURFACE than any other, and has ALL GOOD QUALITIES and NONE of the BAD of OTHER SANDS :: :: :: ::

The Newport Sand Bank Co., NEWPORT, KY.

Castings in Quantities

from one pattern should be made on a molding machine. There is no reason on earth why tedious and imperfect hand labor should not give way.

We have successfully designed **Maywood Machines** for molding a great many complicated castings which expert molders declared could only be made by hand. Possibly you have a few jobs of that kind on which competition is strong. If so, give us a chance to make an estimate of what it will cost to place your shop at the head of the procession.



A Maywood Molding Machine.

For shops that are tired of paying out their good money for muscle we have the **Maywood Pneumatic Rammer,** with which one man can pound as much sand as four. If you have any work which requires a lot of ramming, this is the machine you ought to get.

Write us and find out what we can do for you. Consultation is free

Maywood Foundry & Machine Co.

MAYWOOD, ILLINOIS, U. S. A.

It's Just Like This

When you want a trunk taken to the depot you don't call a four horse truck, do you? You telephone for a light express wagon which comes and gets your baggage and has it delivered before they could hitch up the teams for the big wagon.

Now in your foundry there may be big loads and small loads to carry. If they are mixed you want a different rig for each kind.

The chances are that you are only fixed to handle heavy loads. You have got that big heavy thirty-ton crane agoing from morning till night. It is traveling forward and backward in its own slow and cumbersome fashion picking up loads which three or four men could carry. While it is doing so somebody is waiting. It is too slow to get around to everybody on time.

That big crane never was intended to be worn out doing the runabout business of your foundry. It was made for handling your heavy work and you should let it do that and do it right.

For your light work you should put up a **COBURN TROLLEY TRACK.** This won't be in the way of anything and the speed at which it handles stuff will surprise you. The men will begin to step briskly too. You know what that means.

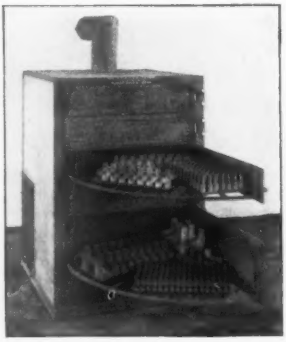
Coburn Trolley Tracks

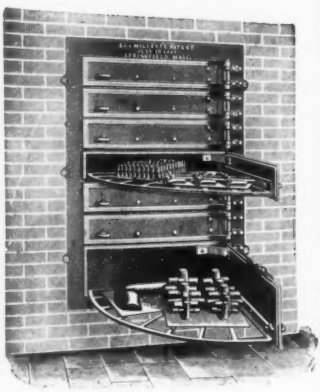
are low in price. We will tell you the exact figure if you will send us a sketch of your shop and describe the space to be covered. You can with it distribute molding sand, coke, castings, iron; in short, anything which has to go in or out of a foundry.

Coburn Trolley Track Mfg. Co.,

HOLYOKE, MASS., U.S.A.

Satisfied users of the MILLETT CORE OVEN are our best advertisements





We are so busy building **Millett Core Ovens** that we haven't got time to write a long sermon for the Convention number of THE FOUNDRY. Just ran across a letter from the **Sessions Foundry Company,** of Bristol, Conn., one of the greatest jobbing foundries in the world and one which meets competition everywhere. Here is what it says:

THE MILLETT CORE OVEN CO.,
Brightwood, Mass.

Gentlemen: We have been using two of your ovens for some time past and they give us excellent satisfaction. They are very economical in fuel, bake the cores well, and are very convenient to use. The two we have just ordered will make four of them that we shall keep in constant use.

W. E. SESSIONS,
Gen'l Mgr., Sessions Foundry Co.

If you have to meet competition you too need a Millett Core Oven.

Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at { THE S. OBERMAYER CO., Cincinnati and Chicago.
and for sale by { THE J. W. PAXSON CO., Philadelphia.
J. W. JACKMAN & CO., 39 Victoria St., London, S. W., England.

Is it as good as Cherry Valley?

THIS is a question which is always asked by the foundryman who is talking pig iron.

He compares the qualities of other brands with those of the **Cherry Valley Iron, the standard** of foundry irons, the best known brand of foundry iron in America. For nearly a quarter of a century it has enjoyed the greatest reputation for being uniform and reliable.

We have worked hard to make the **Cherry Valley Iron** the best foundry iron that is made. We built our own coke ovens in order to secure a perfect quality of fuel. In selecting our ores we are very careful to buy nothing but the best.

Is it any wonder that foundrymen praise **Cherry Valley Iron** when it is the one brand of iron that keeps their shops straight? Let us have your order early so that we may prepare to take care of you.

The Cherry Valley Iron Co.

MURTLAND BUILDING, PITTSBURG, PA.

THOS. H. WELLS, Pres. F. H. WICK, Treas.
JOHN C. WICK, Vice-Pres. R. BENTLEY, Sec. & Gen. Mgr.

MARY FURNACE

The Ohio Iron and Steel Co.

MANUFACTURERS OF

High Grade Foundry and Bessemer Pig Iron

Foundry Brands:
"The Mary," "The Mary Ohio Scotch"

LOWELLVILLE,
Mahoning County, Ohio.

AGENCIES:
Messrs. Pickands, Mather & Co., Cleveland, O.
Messrs. Pickands, Brown & Co., Chicago, Ill.
Messrs. N. S. Bartlett & Co., Boston, Mass., and New York, N. Y.
Messrs. Howe, Johnson & Co., Philadelphia, Pa.
Mr. H. G. Dravo, Pittsburg, Pa.

A Blessing to Brass Founders

The majority of brass founders use more or less scrap. They have to.

In doing so it is difficult to obtain a pure brass casting. This is because iron in the form of filings, or small screws, will find its way to the melting pot, causing a great deal of trouble.

We were bothered the same way for many years. We experimented and succeeded in producing a **Metal Purifier,** which we guarantee will remove all impurities, such as iron and similar substances, from brass, when melting.

Not only will our **Metal Purifier** make the old stock as good as the new for casting purposes, but it will also preserve the life of the crucible, while other materials used as a flux tend to destroy the crucible.

Another strong point in favor of our **Metal Purifier** is that it increases the strength of cast brass fully thirty per cent.

We sell our **Metal Purifier** in kegs of 100 pounds at 7½ cents per pound. Barrels containing 500 pounds may be had at 6 cents per pound, F. O. B. Chicago.

We guarantee our **Metal Purifier** to give perfect service, every pound of it. Prominent brass founders throughout the country use it. A trial order will have prompt attention.

The up-to-date brass foundry uses our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We carry a stock of the best makes of Crucibles at the lowest prices.

We also make a specialty of supplying brass foundries with Scrap Metals of all kinds at the lowest market prices, put up in crucible shape, if so desired.

Swarts Metal Refining Co.

SMELTERS AND REFINERS

Main Office and Works, 18-20 N. Desplaines St.,

ESTABLISHED 1885.
INCORPORATED 1895.

CHICAGO, ILL.

YOU CAN BANK ON AYERS' ZANESVILLE MOLDING SAND

every time. When your sand heaps contain nothing but the sand that Ayers ships, you have got the very best sand in the world, the kind that allows your molders to ram up their molds with the least securing.

Some molding sands have to be nailed all over. They will not hang together, and if there is a corner left whithout a spike in it, off it goes the minute the iron strikes it. Not so with **Ayers' Zanesville Sand.** It has got the right body for rapid work.

Then again there are molding sands which have body enough but must be filled full of holes or else the iron goes to the roof of the shop when the mold is poured. These sands lack porousness. **Ayers' Zanesville Sand** is open enough, just the right amount of porosity. At least that is what the foundrymen say, and they back up their statements with orders for more of **Ayers' Sand** year after year.

Ayers' Zanesville Sand comes in grades suited to all classes of work. In ordering, tell us what kind of castings you make so that we may suit you to a "T."

E. M. AYERS, ZANESVILLE, OHIO.

EVERYTHING FOR THE FOUNDRY

Do You Make Cores?

If you do and use oil, we want to tell you something about our

Alright Core Oil

This is an oil that does the work. It makes as good cores as linseed oil, without so much smoke and smell. It is far superior to all substitutes and our price is always one-third less than market price of linseed. We have lately increased our capacity for making Alright Core Oil and can take care of orders for same more promptly than heretofore.

If you do not like a liquid for making cores, then use

Standard Core Compound (Dry)

This has been used by foundrymen for a long time, and the fact that the amount sold doubles from year to year is evidence that it fills the bill.

As cheap as Core Flour and far superior.

We will give every coremaker a chance to try it.

Sole Manufacturers and Distributors,

The J. D. Smith Foundry Supply Co.

PROPRIETORS

CLEVELAND FACING MILLS

CLEVELAND CINCINNATI

It is Our Regular Business

To Supply Iron and Brass Foundries with what they need. There is nothing that they have use for that we do not supply

IF you are needing Facings, Blackings, Plumbago or Silver Lead, Core Wash, Core Compound, Molding Sand, Steel Wire Casting Cleaning Brushes, Soft or Hard Bristle Brushes, Core Box Brushes, Camel Hair Brushes, Shovels, Coke Forks, Bellows, Brass, Galvanized or Iron Wire Riddles, Bench or Floor Rammers, White Metal or Brass Pattern Letters, Fire Brick, Fire Clay, Plaster Paris, Stove Cement, Snap Flasks, Molders' Tools, etc., etc., we shall appreciate your orders. If you are thinking of buying a Cupola, Blower, or Fan, Crane, Tumbling Barrels, Magnetic Iron and Brass Filings Separator, Water Barrels for Brass Cleaning, Hay or Straw Rope Twisters, Pig Iron Testers, Brass Melting Furnaces, Drying Stove, Coke Oven, Cast or Wrought Iron Ladles, we would like to know it and would appreciate an opportunity of telling you what we have to offer and the price. Have you one of our 225-page catalogues? : : : : : : : :

The J. D. Smith Foundry Supply Co.

. . . Proprietors of . . .

THE CLEVELAND FACING MILL

Cleveland, Ohio — Cincinnati, Ohio

For

Summer Ventilation

use a

STURTEVANT ELECTRIC FAN

Built in a full line of sizes from 18 inch to 120 inch with capacities from 2000 to 175000 cu. ft. per minute. Motor is entirely enclosed. Also built as pulley fans in same sizes. :: ::

B. F. STURTEVANT CO.

BOSTON, MASS.

NEW YORK. PHILADELPHIA. CHICAGO. LONDON.

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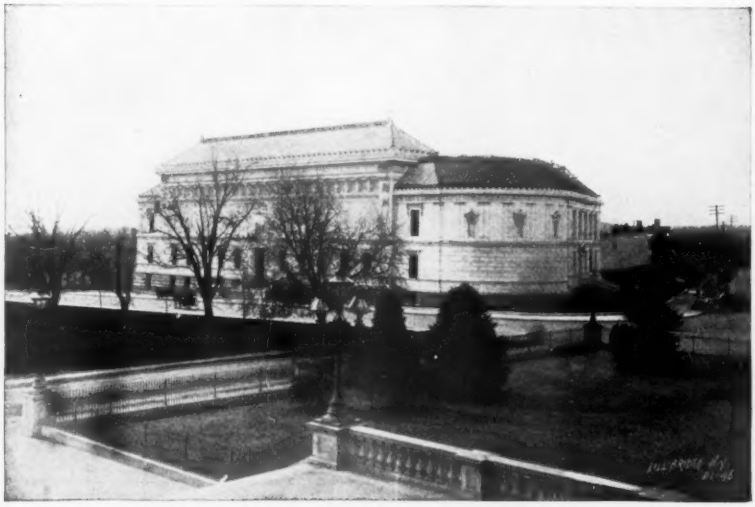


CORCORAN ART GALLERY, Washington, D. C.

Structural Steel

Furnished and Erected by the

American Bridge Company

GENERAL OFFICES 100 BROADWAY NEW YORK

Structural Steel and Iron

ENGINEERS, MANUFACTURERS and CONTRACTORS
FOR BUILDINGS, ROOFS, BRIDGES and ALL CLASSES of
METALLIC STRUCTURES

Branch Offices throughout the Country. European Office: LONDON

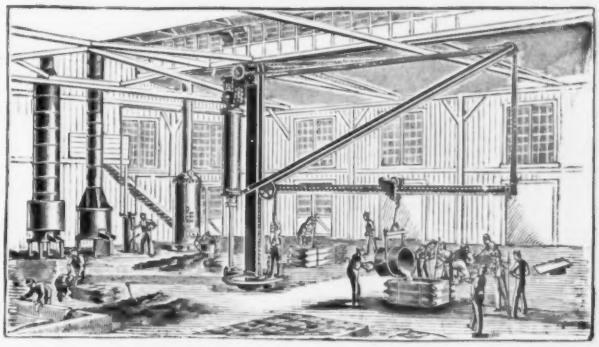
LIL-BRIDGE, N. Y., 21-81.

JUST ASK CHARLIE SCHWAB,

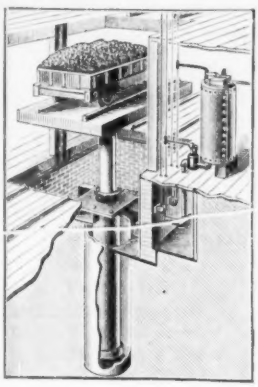
President of pretty near everything that makes iron and steel stuff, if the Ridgway Steam Hydraulic Cranes and Elevators are not all right and just what they are cracked up to be.

He has recently become a big user of Ridgway machines by the Big Consolidation of which he is the head.

Whether the Ridgway Cranes made this great combine possible or not we do not care to say; the only thing we do know is that if you care to make inquiries, you will find that Mr. Schwab has only words of highest praise for Ridgway machines.



5-Ton Steam Hydraulic Crane in a Foundry.



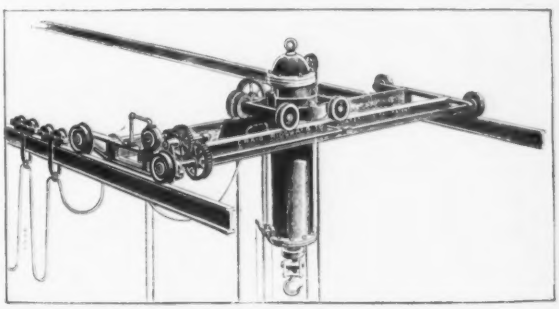
Smart managers everywhere tie to Ridgway machines because they have right at hand devices which need only a little piece of steam pipe to install, and when in operation use steam with an economy which is simply astonishing.

Then, besides, the Ridgway Cranes work so smoothly, noiselessly and quickly that they make money hand over fist In the foundry business, for example, those who have Ridgway Cranes say the same molders will do 50 per cent. more work for the same wages.

True or not true, the same fellows keep a-getting more and more Ridgway Cranes all the time.

Oil Governed Air Hoists.

The best concerns everywhere get these hoists, especially in large sizes. We have them in use up to 50 tons capacity. Would you like to work under an ordinary uncontrolled air hoist of 50 tons capacity? Would 50 tons kill you any deader than say 3 or 5 tons? Why not get safe hoists while you are at it? What is a few dollars on an air hoist as against safety and perfect, jerkless action?



"Please Take the Elevator."

Like all the other fellows.

"HOOK 'ER TO THE BILER."

CRAIG RIDGWAY & SON CO.,

COATESVILLE, PA.

European Agt., **CHAS. G. ECKSTEIN, 16 Spandauerstr., BERLIN, GERMANY.**

William Sellers & Co., Incorp.

PHILADELPHIA, PA.

MODERN FOUNDRY MACHINERY

SAND MIXER

Not an Experiment

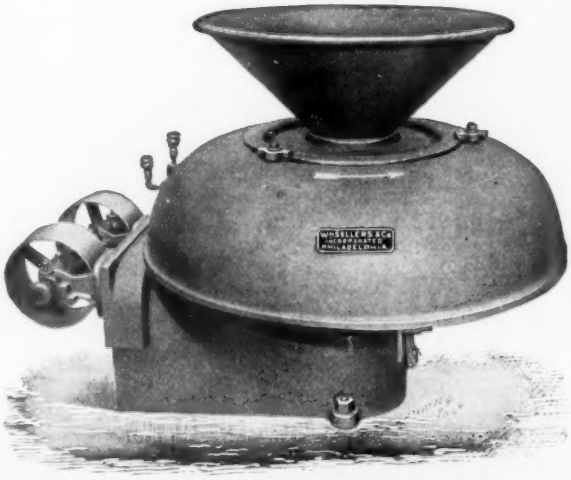
PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand,** we have issued a small pamphlet which will be sent on application.

Among late Purchasers are:

American Radiator Co., Buffalo, N. Y.
American Radiator Co., Titusville, Pa.
National Malleable Castings Co., Indianapolis, Ind.
National Malleable Castings Co., Cleveland, Ohio.
Fischer Foundry & Machine Co., Pittsburg, Pa.
R. Hoe & Co., New York.
U. S. Arsenal, Rock Island, Ill.
Michigan Malleable Iron Co., Detroit, Mich.
New York Air Brake Co., Watertown, N. Y.
Norfolk & Western R. R., Roanoke, Va.
And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence is Solicited.



Over 16,000 in Use.

ALWAYS READY!

800 TO 4,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to all Railroads and Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y and Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G CO.,

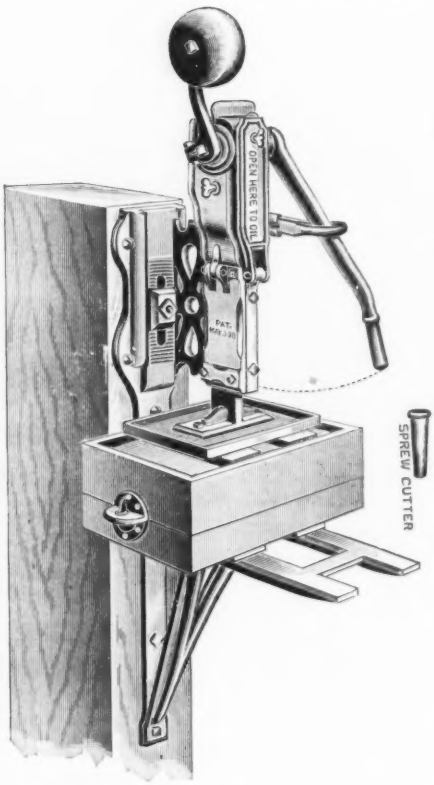
EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts.

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

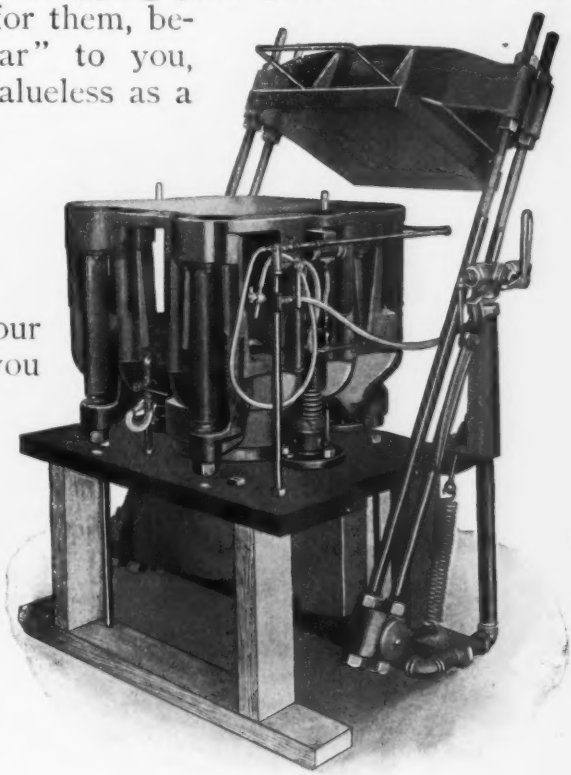
SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

J. W. JACKMAN & CO.
Sole European Representatives, London, S. W., Eng.

TABOR MOLDING MACHINES

If you want Power Ramming Molding Machines—machines which do all the work except putting in the sand, setting the cores, and pouring the metal—and if you are not fond of filling catacombs full of expensive stripping plate patterns, which you keep, once you have paid for them, because they were so "dear" to you, though they may be as valueless as a departed mother-in-law,



BUY TABOR MACHINES

If you just want to use your wooden patterns quickly, you can stick them on our Paraffined Wooden Plates, and draw them with our Vibrator, if you

BUY THE TABOR

If you have a lot of gated patterns, which hand-rapping is continually knocking to pieces, you can save pattern repairs and get to machine molding of the highest class, by using our Vibrator Frame system, so

BUY A TABOR

Write us for the latest truths about Machine Molding.

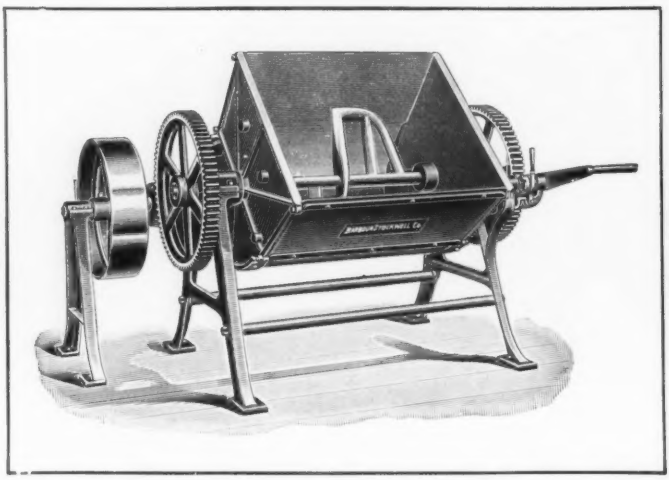
The Tabor Manufacturing Co.

18th & Hamilton Sts., Philadelphia.

JAMES HARTLEY & CO. OF MANCHESTER, LTD.,
38 Victoria Bldgs. London, England.

SCHUCHARDT & SCHUTTE,
Berlin, Vienna, Brussels, St. Petersburg.

Boston Foundry Mixer.



DRIVEN BY BELT OR BY MOTOR.

By its use you have a better mixed core-sand and facing at one-half the cost of that mixed by the old methods.

This Mixer is in use in many of the largest Foundries in the United States.

On Exhibition and For Sale by . . .

THE S. OBERMAYER COMPANY,

18th and Rockwell Streets, CHICAGO, ILL.

FOR PARTICULARS REGARDING OUR MIXER AND SAND SIFTERS, WRITE

BARBOUR-STOCKWELL CO.

205 Broadway, CAMBRIDGEPORT, MASS.

F. E. GORDON, Pres. Established 1879.

MOULDING SAND

OUR PRODUCT has always given perfect satisfaction ; *it always will.*

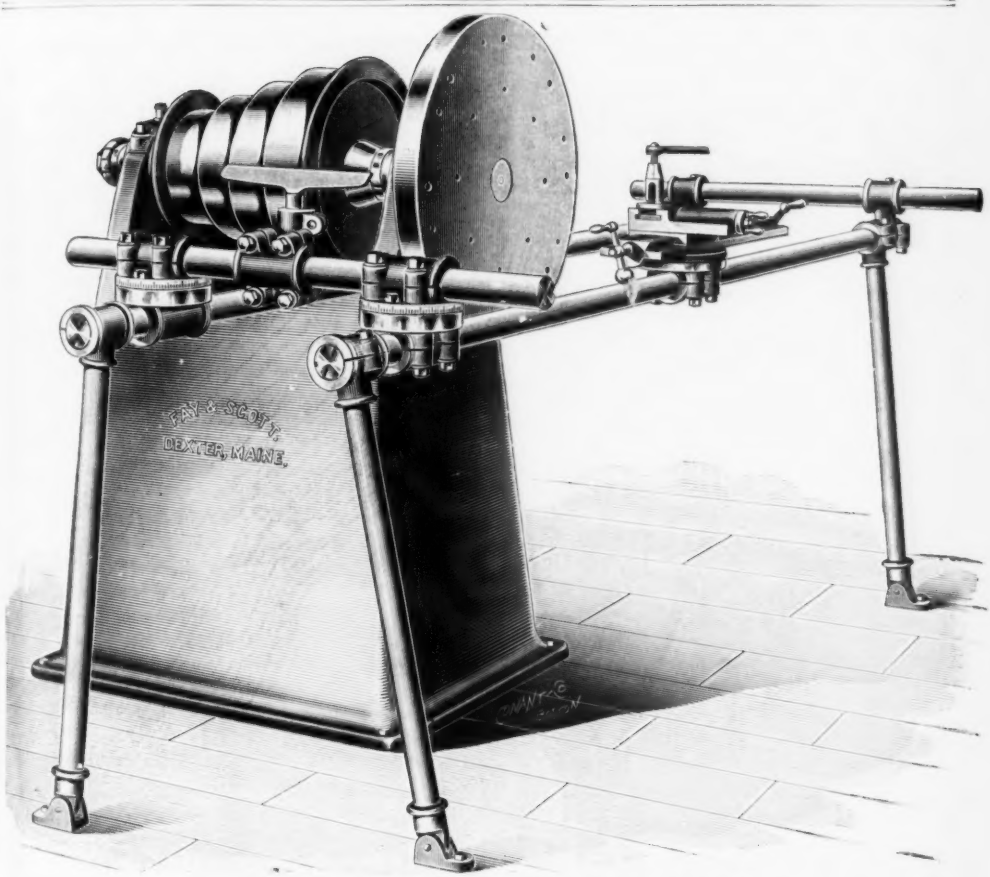
System, eternal vigilance and energy, coupled with our practical foundry experience of 17 years, produces results, in *our* product, that foundrymen have always wanted, and our reward has been an ever-increasing trade.

Let us prove it to you.

The OHIO SAND CO.

CONNEAUT, O.

Our Sand is SECOND TO NONE. Banks at Conneaut, Springfield and Kingsville. Samples and prices on application.



84-INCH SWING FACE PLATE LATHE.

YOUR PATTERN SHOP

demands attention, just as well as your foundry. Without suitable tools for your patternmakers you are handicapped at the outset. We have made a specialty of Patternmakers' Lathes for the past sixteen years and have supplied the majority of the leading shops at home, besides many abroad. We make regular Patternmakers' Lathes from 10-in. to 84-in. swing, and are prepared to furnish specifications for anything in this line which may be called for, of any size or description.

Drop us a postal card for our catalogue and state what you need. We can furnish it at reasonable prices.

FAY & SCOTT, **DEXTER, MAINE, U. S. A.**

Cable Address: FAYSCOTT.

The Farwell Molding Machines

SEND FOR CATALOGUE

Patented Dec. 21, 1897, and Nov. 22, 1898.

The above cut shows the Farwell Universal Molding Machine equipped with stripping plate pattern. This Machine is designed to press the mold and draw the pattern. The small lever in center enables the molder to rap and draw his pattern at the same time.

This machine can also be used as a plain press, and is made in several sizes and styles.

Complete catalogue sent on request.

MANUFACTURED BY

THE ADAMS COMPANY,

Dubuque, Iowa, U. S. A.

J. W. JACKMAN & Co., British Agents, London, S.W., England.
V. LOWENER, Copenhagen, K., Agt. for Denmark, Sweden and Norway.
H. GLAENZER & PERREAUD, Paris (XIe. Arrt.), Agents for France.
C. E. LACY-HULBERT, Brussells, Agent for Belgium.
HENRY PELS & Co., Berlin, S. O. 16, Agents for Germany, Austria, Russia and Switzerland.
ING. G. PONTREMOLI & Co., Milan, Agents for Italy.
WYNMALEN & HAUSMAN, Rotterdam, Agents for Holland.

The CHICAGO FIRE BRICK COMPANY,

MANUFACTURERS

Foundry Facings
Cupola Blocks
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East India Plumbago
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Heavy Mineral
Powdered Charcoal
Ingot Mold Blacking
Bolted Cement
Coke Blacking
Stove Plate
Talc

Sea Coal
Vulcan Blacking
Return Facing
Fire Proof
Soapstone
Rhode Island
Lehigh
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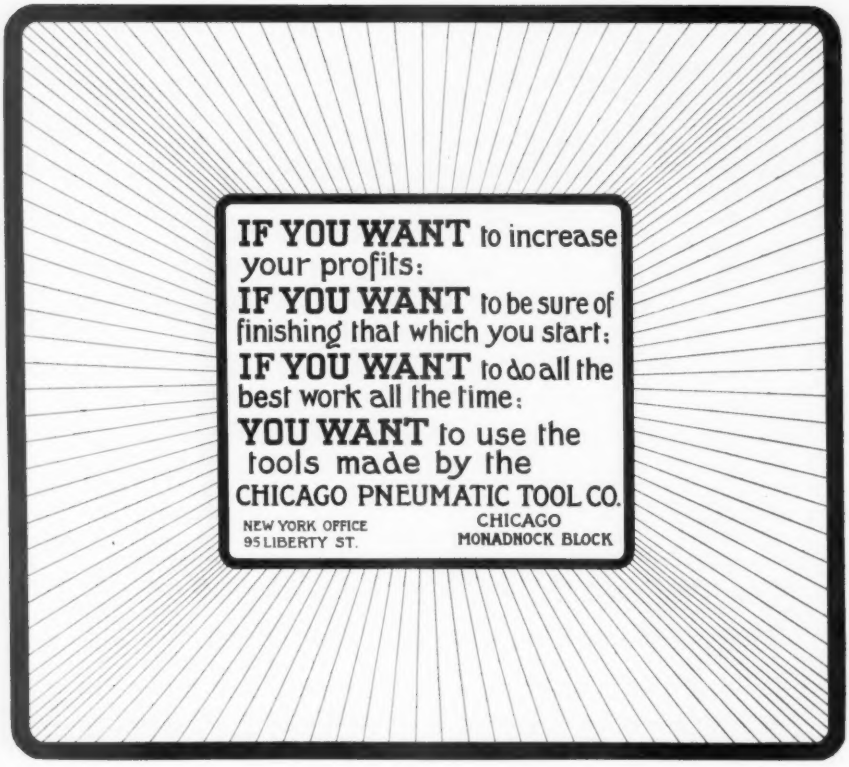
Quality and Prices Right

Try Us and be Convinced

519 Chamber of Commerce, CHICAGO, ILL.


IF YOU WANT to increase your profits:
IF YOU WANT to be sure of finishing that which you start:
IF YOU WANT to do all the best work all the time:
YOU WANT to use the tools made by the
CHICAGO PNEUMATIC TOOL CO.
NEW YORK OFFICE
95 LIBERTY ST.
CHICAGO
MONADNOCK BLOCK

PATENT RIBBED FLASKS

BEST.

NEWEST.

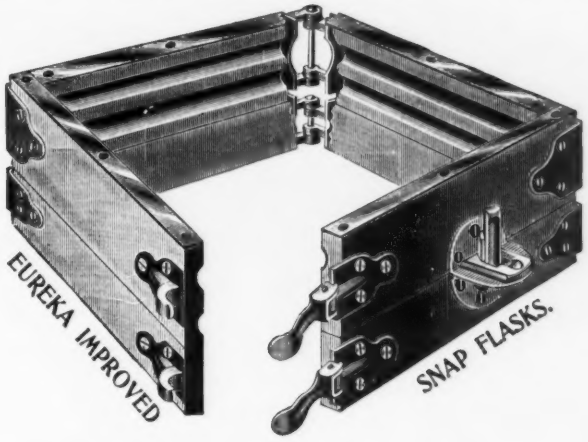
Thousands in Use Everywhere.

Guaranteed Perfect.

IRON FLASKS

for brass foundries and wood flasks for iron foundries are guaranteed accurate. We make all sizes and kinds and you cannot get better. Send for our catalogue—it contains articles you need and which we can sell you at the most favorable prices.

WOOD FLASKS FOR IRON FOUNDRIES



Brass Founders Supply Co., NEWARK, N. J., U. S. A.

"PERFECT CORE OIL"

IS EQUAL TO RAW LINSEED OIL.

Good core oil is of very great importance to the foundryman, good cores save money, keeps the scrap heap from becoming overgrown, and you can't make good cores without using good oil and sharp white sand, either sea shore or lake.

You can't use Perfect Oil and obtain good results from loam molding sand.

Our Core Oil.

We think it's the best that can be had at any price, so do many others.

Reynolds-Chalou Foundry Co. of Troy, N. Y., says:

Your Core Oil has proved itself very satisfactory. It is the only Core Oil we have tested that has equaled Linseed. In fact, we prefer it to Linseed, as it has not the disagreeable gases common to Linseed, neither are we using any more of the Perfect Core Oil than we did of Linseed, and making better cores.

Erie Foundry Co. of Erie, Pa., says:

Please send us at once a bbl. of core oil on our contract. We are pleased to say that we have now given this oil a very thorough trial and find that it is the best thing of the kind that we have ever used. It is not only efficient but economical, and we predict for you a large success with this oil.

The Chas. Parker Co. of Meriden, Conn., says:

Your Perfect Core Oil has given very good satisfaction. It is doing all you claim for it, and think we have shown our appreciation by sending you another order for one barrel.

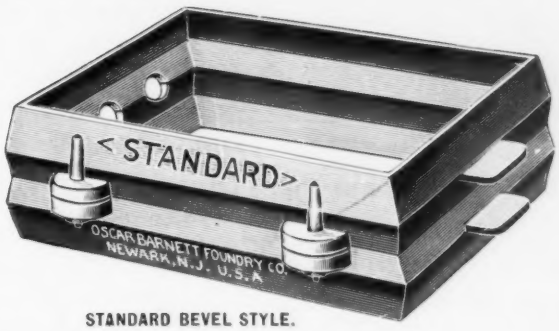
You would say about the same thing after using "PERFECT CORE OIL."

WE HAVE A LITTLE BOOK THAT TELLS YOU ALL ABOUT IT. IT 'S YOURS FOR THE ASKING.

CLARKSON & FORD

224 and 226 Front Street NEW YORK, U. S. A.

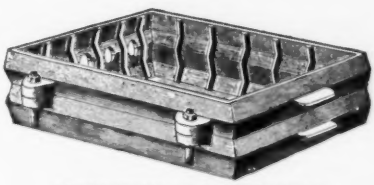
COMPLETE EQUIPMENT
for BRASS FOUNDRIES



STANDARD BEVEL STYLE.

FLASKS, FURNACES, DRYING STOVES,
SPILL TROUGHS, CLAMPS, BOARDS,
TONGS, CRUCIBLES, ETC.

ALL FLASKS ARE
GUARANTEED INTERCHANGEABLE
WITH ANY OSCAR BARNETT
<STANDARD>
FLASKS OF SAME SIZE MADE IN
THE PAST FORTY-FIVE YEARS.



PERPENDICULAR RIBBED STYLE.

SPECIAL FLASKS FOR MACHINE
MOLDING MADE TO ORDER AT
REASONABLE PRICES

OSCAR BARNETT FOUNDRY CO.,

FOUNDED 1845. NEWARK, N. J., U. S. A.

McKEEFREY & COMPANY

Coal, Coke and Pig Iron

Pittsburg, Pa. Leetonia, Ohio

SELLING AGENTS

C. L. PEIRSON & Co., New York and Boston

W. W. BACKMAN, Chicago HENRY L. COE, Cleveland

JEROME KEELEY & CO., Philadelphia

SENECA

The strongest coke iron manufactured in the United States. Suitable for manufacturing agricultural implements, engines and other machinery where extra strength is required : :

GRAFTON

Soft and fluid. Softer than Imported Scotch Iron. Gives excellent results as a softener and used to good advantage for making small castings of any description : : : : :

ALLEGHENY

A good neutral pig iron. Medium in strength and softness. Gives fine results in hollow-ware and stove plate, and in castings requiring medium strength : : : : : : : :

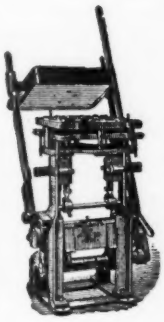
COKE

72 hour genuine Connellsville Foundry coke. Selected with extra care for foundry practice and used in the manufacture of our pig iron : : : : . : : : : : : :

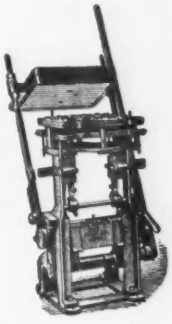
CRUSHED COKE SOFT COKE

PITTSBURG STEAM AND GAS COAL

FIRST CLASS OHIO STEAM AND DOMESTIC COAL



Moulding Machines



(McCANNA PATENT.)

NOT A CHEAP PRESS, BUT A MOULDING MACHINE

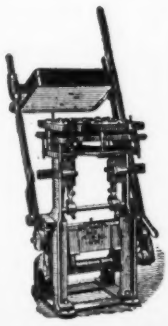
This machine has a patent flask lifting and rapping attachment, which does away with stripping plates.

Patterns plated from $4.00 up when patterns are furnished.

Flasks, $2.75 per pair.

These machines are being used by the leading foundries in this country.

SEND FOR CATALOGUE



Thomas Turner

Manufacturer of Moulding Machines and Automatic Cock Grinders Metal Pattern Making

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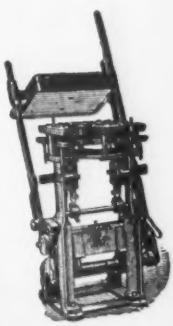
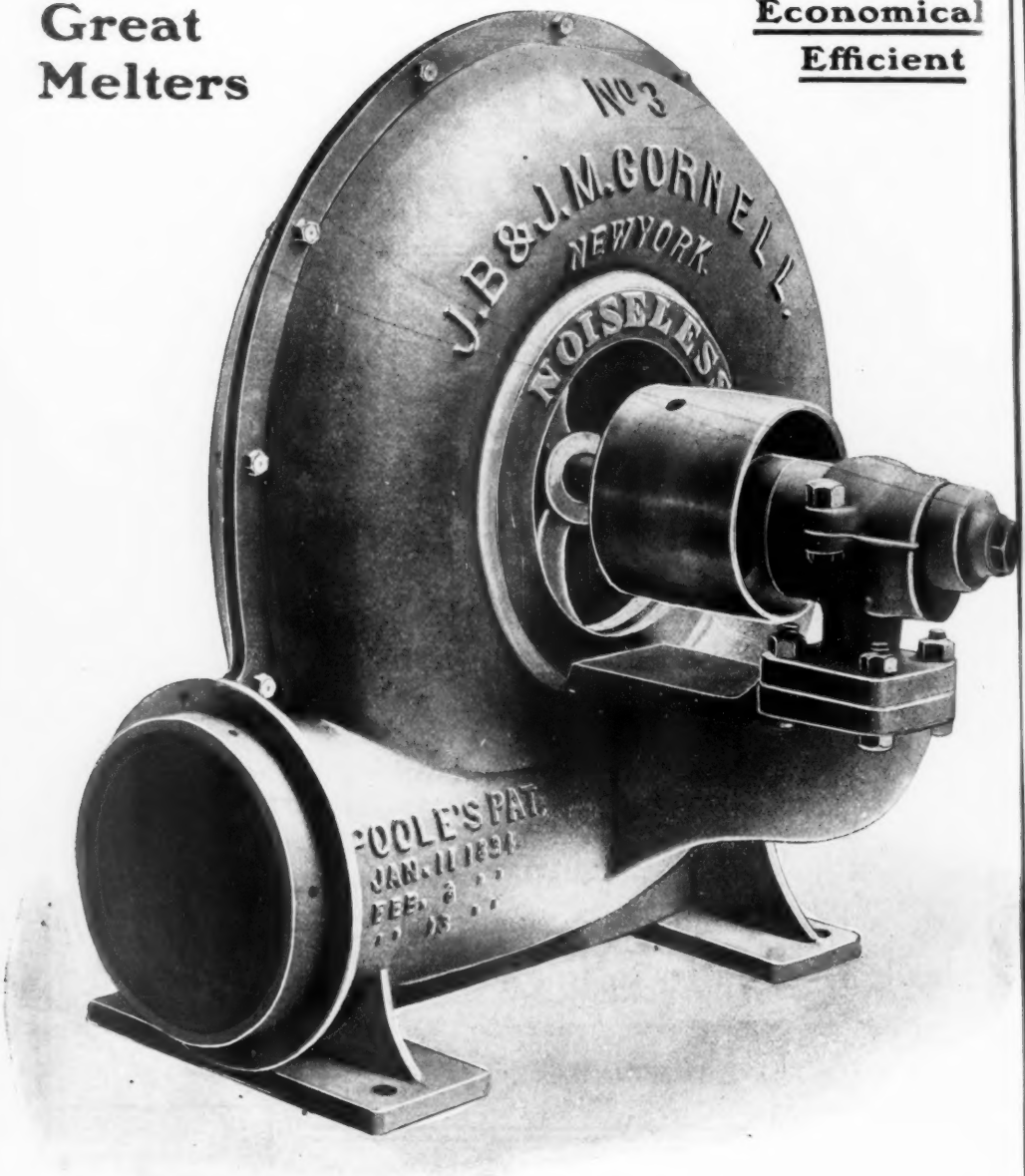


Great Melters

Economical
Efficient



The **Cornell Blowers** are great melters. On February 21st, 1900, we melted, with a **No. 8 Cornell,** 104,000 pounds of iron in a 48-inch cupola with 9,300 pounds of coke, giving a ratio of 1 to 11.18.

The metal was carried over 450 feet and cast into pieces weighing from ½ to 24,000 pounds. The rate of melting was 10 tons per hour.

Can any other make of blower equal this performance?

J. B. & J. M. CORNELL,

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ESTABLISHED 1875.

Stow Mfg. Co.,

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Inventors and oldest manufacturers
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STOW FLEXIBLE SHAFT

FOR ALL PURPOSES.

PORTABLE EMERY GRINDER

When your castings are too heavy to comfortably handle, isn't it good shop practice to

TAKE THE TOOL TO THE WORK instead of
THE WORK TO THE TOOL?

Thousands think so and use this Emery Grinder. VERY CONVENIENT IN YOUR ERECTING DEPARTMENT for grinding off imperfections previously unnoticed.

We should be pleased to send you Catalogue and quote you prices.

Gen'l European Agts.,
SELIG SONNENTHAL & CO.,
85 Queen Victoria St., London, Eng.

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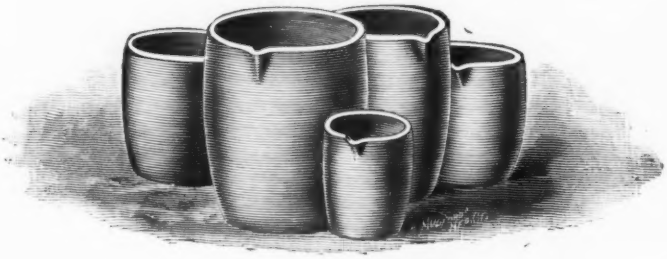
BRIDGEPORT CRUCIBLE CO.

MANUFACTURERS OF

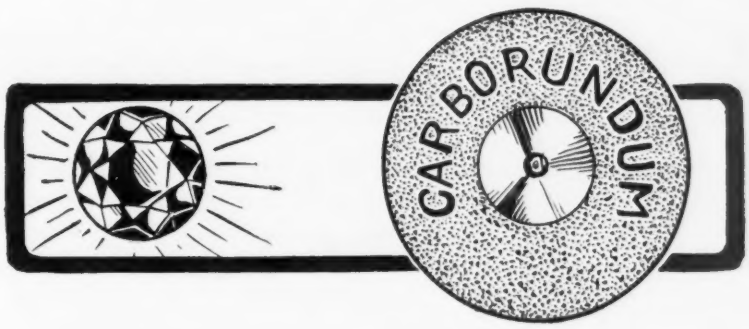
BLACK LEAD CRUCIBLES



CLIMAX FURNACE CLAY

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U.S.A.



LIKE A DIAMOND

Carborundum is practically the diamond in commercial form.

Its hardness, sharpness and brittleness are diamond like characteristics that are possessed by no other abrasive material on earth.

Carborundum costs a little more in the first place than other abrasives—but so does a locomotive cost more than a cart horse.

And the reason is the same.

Carborundum does two, or three, or possibly five times as much work as other abrasives before wearing out—

It also does its work much faster, much cleaner, much more satisfactorily.

Its hardness and brittleness prevent it from growing smooth or gummy, hence it requires practically no dressing or other attention.

It is like a good workman—start it going, and you can depend upon it to do just what you expect it to.

The new catalogue tells the Carborundum story very interestingly—Shall we send it to you?

The Carborundum Company,

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PNEUMATIC AND HAND POWER

(Patents Pending.)

Traveling and Jib Cranes

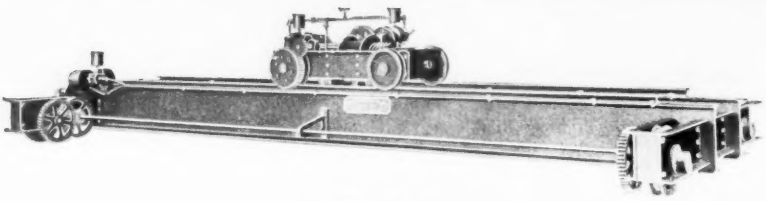

Fig. 145.

Double bridge beam Pneumatic Traveling Crane. All movements are operated by Air Motors.

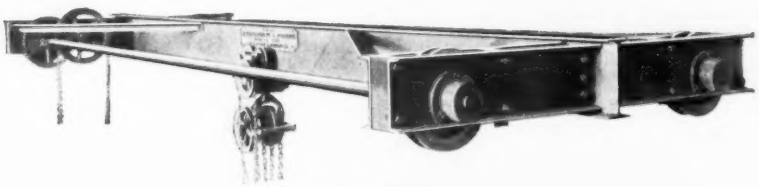

Fig. 107.

Small Hand Power Traveling Crane. Single Bridge Beam.

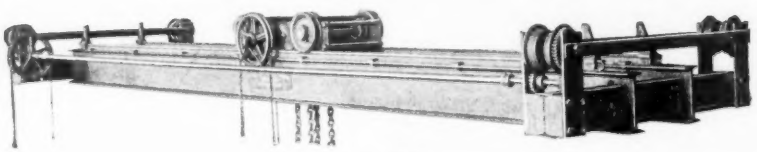

Fig. 150.

Suspended Hand Power Traveling Crane. Double Bridge Beam. This style of Crane is made necessary where the track has to be fastened to the ceiling.

Send for Catalogue illustrating a large line of Cranes, Pneumatic Hoists, Chain Hoists, Trolleys, etc., etc.

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CLEVELAND OHIO

The Right Pig Iron in the Right Place

Tell us the kind of castings you want to make and we will furnish you with the kind of Pig Iron best adapted to make them.

Pig Iron

for malleables and for all kinds of gray castings :: :: :: ::

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of known quality from Connellsville and West Virginia. :: ::

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DREXEL BUILDING, PHILADELPHIA.

....THE....

Hanna Portable Pneumatic Screen Shaker.

PLEASE NOTE WHAT ONE USER OF THE PNEUMATIC SCREEN SHAKER HAS TO SAY:

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CHICAGO, U.S.A.
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THE LINK-BELT ENGINEERING CO.
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March 22, 1901.

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We are in receipt of your communication of the 20th, asking for an expression from us relative to our experience with your Pneumatic Screen Shakers. In reply would state - we have one stationary and two portable shaker screens in use the last four months and will cheerfully recommend them to any one you may refer to us. We find them very useful and economical; also find them popular with our foundry employes.

Very truly yours,

H. K. McLean

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E. E. HANNA,

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Value Received

This is what you get for your money when you buy :: :: :: :: :: :: ::

Powellton Coke

[ANALYSIS BY MCCREATH]

Fixed Carbon,	*91.048*
Ash,	*7.548*
Vol. Matter,	*.661*
Sulphur,	*.626*
Moisture,	*.117*
	100.000
Phosphorus,	*.007*

PHYSICAL tests by Prof. Fulton are even better than the Chemical Analysis, but the ***proof*** of its qualities ***is in the Cupola. That's where POWELLTON COKE speaks for itself. Will you give it a chance to talk?*** That's all we ask—all we need. The best foundries in America use it. The price is like the Coke—all right. Write us now, while you think of it; we will be glad to answer your enquiries.

The Mount Carbon Company

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GLUTROSE
CORE COMPOUND

IF YOU

want a compound that will enable you to use many parts of old sand; that enables you to dispense with rods and vents in a great many cores; that will not give off offensive odors; that will not be wasted; that will save half the cost of cleaning cores out of castings and also leave the core box clean; that makes the edges and thin places of cores sharp and strong; that can be used to good advantage on the molds; that will keep any length of time; that

WILL NOT BLOW YOUR CASTINGS

that leaves castings smooth and releases the cores easily; that is always ready for use——

USE GLUTROSE.

Cheaper and better than flour, oil, rosin, molasses or any compound made. One barrel is equal to four barrels of the best flour made.

AMERICAN GLUTROSE WORKS,
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It is three years ago since we began business. In those three years we have built up what is now the largest facing factory in the world. We have made the business which keeps this factory going (most of the time twenty-four hours a day) by giving the foundrymen of the country the best quality of goods at the lowest price. ∴ ∴ ∴ ∴ Our competitors cannot give the same quality of goods for the same price as we do, because their mills and equipment are obsolete. ∴ ∴ ∴ ∴ ∴ When in Cincinnati call at our works and we will take pleasure in showing you through the most up-to-date facing mill in existence. ∴ ∴ ∴ ∴ ∴ We can supply you with anything used in your foundry. Write us for prices and information on any article you need.

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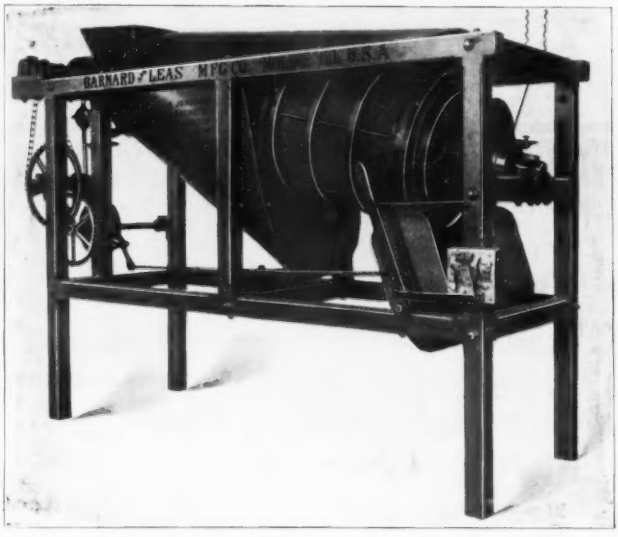
CINCINNATI, OHIO, U. S. A.

Importers and Refiners of Graphite and Ceylon Plumbago for all Purposes

Foundry Facings, Supplies and Complete Equipments

Automatic Magnetic Separator.



MESSRS. BARNARD & LEAS MFG. CO.,
Moline, Illinois.

You may ship us immediately for trial, one of your ***Automatic Magnetic Separators***, on the following terms and conditions, viz.:

We agree to operate your machine on thirty days' trial in competition with any machine that we may desire. We to operate all machines in this trial ourselves in a strictly fair and impartial manner. After said trial we will decide between the machines so operated by us, strictly on their merits, and will retain the machine that proves the most satisfactory to us; it being understood that the discarded machines are to be removed from our plant at the expense of the manufacturers of said machines. It also being distinctly understood that we have the right to operate your machine in competition with any and all other machines on the market, without any reservation on your part.

ANY FOUNDRY IN THE UNITED STATES desiring to test the merits of our ***Automatic Magnetic Separator***, in trial with any other machine manufactured, can do so by signing the above order (or a copy of same) and mailing to us, when we will comply with our part of the agreement at the earliest possible date. We guarantee there is no machine on the market that can be operated at less expense or with less power.

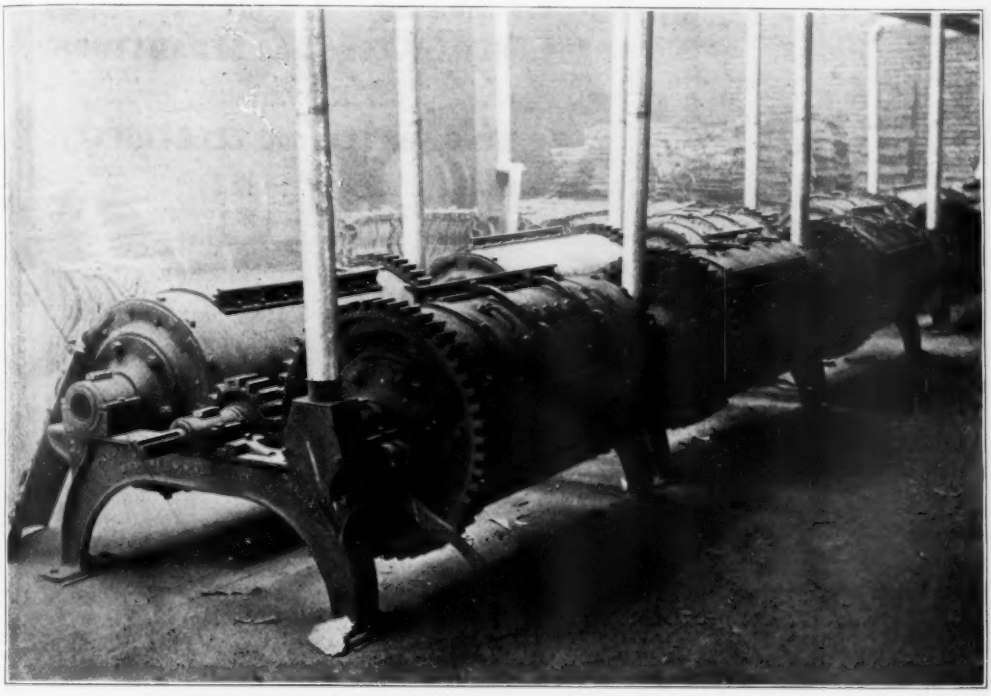
Furthermore our ***Automatic*** machine represents the acme of convenience and capacity in operation, and will guarantee it to save practically all metal in waste passed through it. Our machine is now in daily use in foundries casting from 8 tons weekly to 350 tons daily.

Circulars, testimonials and full information furnished on request.

BARNARD & LEAS MFG. CO.,
MOLINE, ILLINOIS.

The SLY Tumbling Barrel

More castings can be cleaned with the **SLY TUMBLING BARREL** than with any other mill of equal size. The **SLY TUMBLING BARREL** can be opened and closed in one-fourth the time possible with other styles of mills.



This illustration shows a portion of a battery of twelve **SLY TUMBLING BARRELS** in the new plant of the Interstate Foundry Co., at Cleveland, Ohio.

Note the absence of dust in the vicinity of the **SLY TUMBLING BARRELS.** In the background there are some old style mills. Observe the cloud of dust which envelopes them.

Write me for an estimate on equipping your plant with the best machinery there is for cleaning castings.

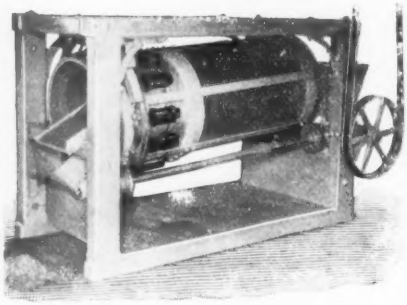
W. W. SLY,

110 Elm Street, CLEVELAND, OHIO, U. S. A.

I also manufacture **SLY'S PATENT WATER MILLS,** for recovering all kinds of metals, except aluminum, from cinders and refuse. Write for testimonials showing how these mills have paid for themselves in a few weeks through the metal they have saved.

Electro-Magnetic Separators

Save Iron and Save Power



There are
SEPARATORS and SEPARATORS
operated variously by
WIND, WATER and ELECTRICITY.

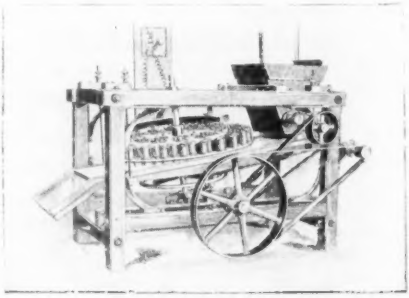
Some are breezy and dusty,
Some are sloppy and rusty.

Some magnetic separators use too much electricity. Some use "permanent" magnets, with a limit to their permanency. Some turn out so much dirt with the iron recovered that it has to be sifted again. Some need a step ladder to reach the hopper. Some are "automatic" but not continuous—when the automatic works, the feed stops. We, however, manufacture magnetic separators that are

All Right Every Way.

Our separators outrank all others in points of **capacity, efficiency, durability, simplicity** and **economy of operation.** They are **automatic** and **continuous, convenient** and **compact,** and can be furnished with belt or motor drive as desired. Our largest separator requires but 1½ amperes where other separators of only one-half the capacity take 15 amperes at the same voltage. Our Type O Separator has a capacity of 100 cubic feet of crushed cinder per hour.

A good Electro-Magnetic Separator is an economizer that no well-regulated foundry can afford to do without. It doubles the capacity of cinder crushers, saves power and recovers much iron that otherwise is lost.



We are in the magnetic separator business exclusively and manufacture different types of separators of standard and special design for any and all purposes, such as are used in brass manufactories, machine shops, foundries, mills, mines, etc.

Write for our latest Catalogue.

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Only Skin Deep

Half of the castings that are thrown on the charging scaffold and melted over again are discarded for some small defect which is only skin deep.

A small sand hole or blow hole, a cold shut or spongy iron in most cases means a bad appearance only. The casting in itself is as strong as if it had been perfect.

For overcoming these defects there is nothing like CAST STEEL CEMENT, which is ready for immediate use, and sets firmly in from twelve to forty-eight hours, becoming part of the casting itself, not only in appearance but in adhesiveness.

For making joints of any kind, which have to withstand pressure, CAST STEEL CEMENT is the only material to use.

Send for a free sample and you will be prepared to take care of any leak that comes along.

The Clark Cast Steel Cement Company

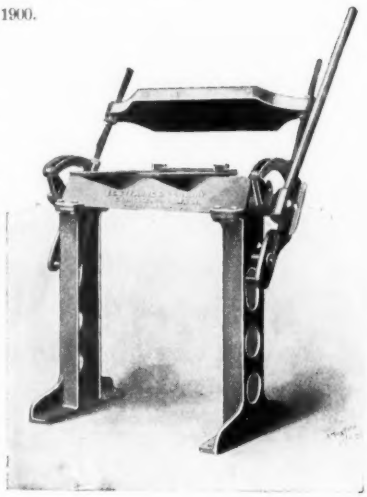
Shelton, Conn., U. S. A.

THE *Stearns*

MOLDING MACHINE

THE PERFECTION OF MOLDING MACHINES.

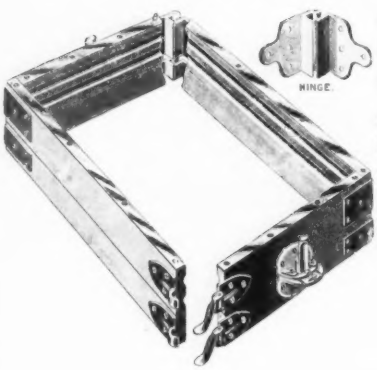
Patented September 25, 1900.



WE are not going to discuss molding machines in general. You all know that no well regulated foundry would attempt to run without them. We wish to tell you a fact or two about the "STEARNS" machine.

As a labor and dollar saving device it has no equal. It increases the number of molds per day by 50%. Increased output—cost of manufacture decreased—results in the machine paying for itself in a short while, and it keeps on paying for something else after that. We have an illustrated pamphlet giving full details. We'll mail it to you if you will ask.

WE MAKE A SNAP FLASK



that will soon pay for itself many times over by the increased amount of work the molder can turn out. Made of white wood, light and strong, perfectly true, equipped with our patent malleable iron hinge, edges and corners bound with iron.

A trial of one will result in equipping the entire foundry with them.

Used in connection with molding machines, Stearns Snap Flasks largely reduce the cost of bench work.

E. C. STEARNS & COMPANY,

HARDWARE MANUFACTURERS
AND FOUNDERS OF FINE GREY IRON CASTINGS,

SYRACUSE, N. Y., U. S. A.

BROWN & SHARPE MFG. CO.

Machinery and Tools.

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1872. 1901.

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GROVES' PATENT
Gear Molding Machine

(FIG. 27.)

Universal Gear Molding Machine

(GROVES' PATENT.)

The machine illustrated above is described as "universal," because it is perfectly adapted for the molding of spur, bevel, helical, staggered or worm toothed gearing (internal or external), from 6 inches to 72 inches diameter, and to 15 inches face; and this variety of work is done without any change of parts except tooth block. Floor space occupied, 9 ft. 6 in. x 6 ft. 6 in.; weight, 6¾ tons (approximately)

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PHILADELPHIA, PA.

Roots' Positive Pressure Blower

ALWAYS THE STANDARD

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The ROOTS obtains the minimum of friction and the maximum of efficiency Others cannot—do not

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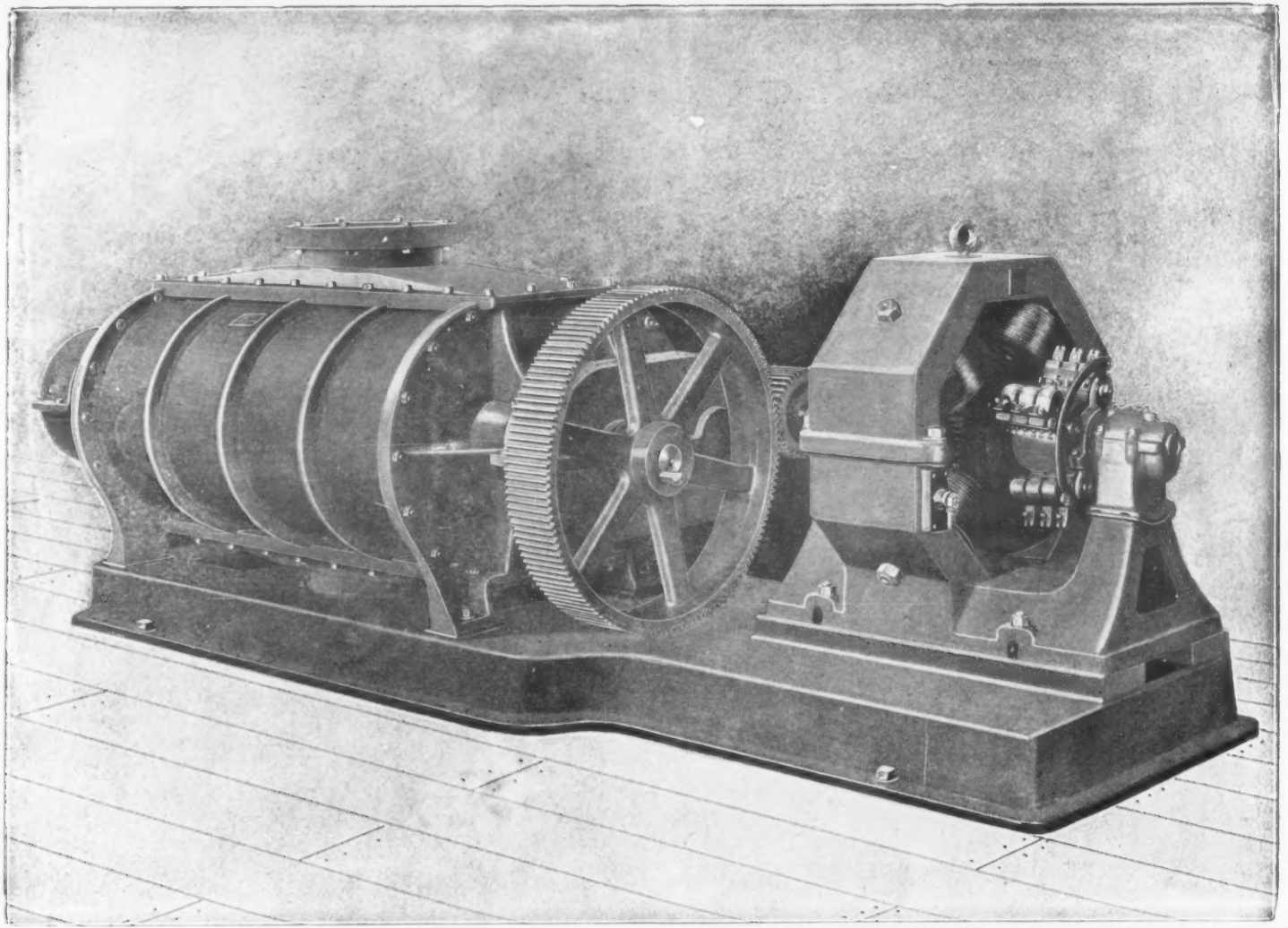
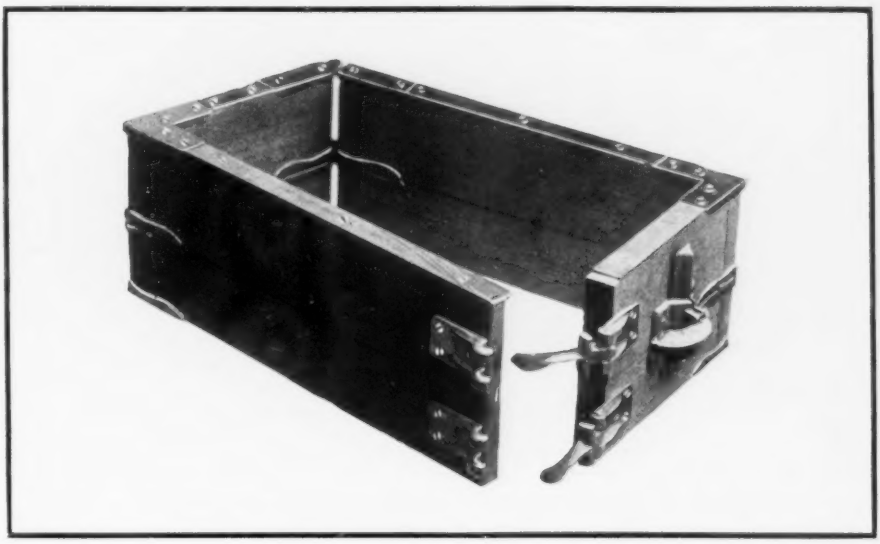


THE EUREKA SNAP FLASK. MODEL A.



The trimmings are all Malleable Iron.

The corners are dovetailed together.

This flask is built especially for machine moulding, therefore is equally good for hand moulding.

It is the strongest snap flask on the market.

They are absolutely unbreakable and they cannot get out of square.

This flask is guaranteed to be perfect in every respect, or it may be returned at our expense.

They are made of 1 1-4 in. Oak, Whitewood or Pine.

We make all sizes, one price.

They are sold by all leading foundry supply dealers or you can order direct of us.

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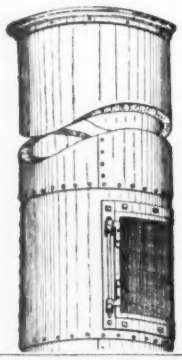
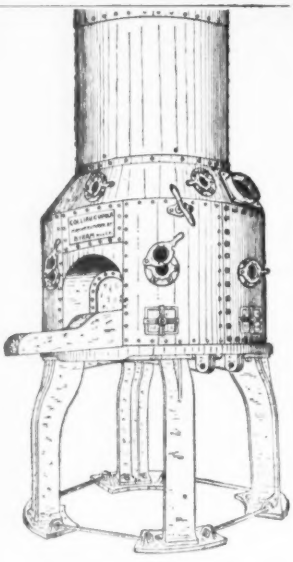
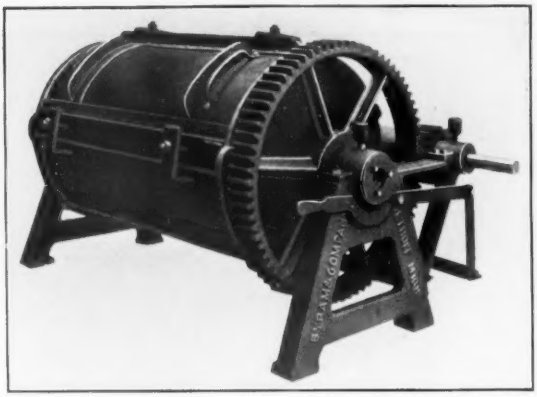


The COLLIAU



The Colliau Cupola is melting more iron every day than all other cupolas together. It is the greatest and most economical melter, as all records show.



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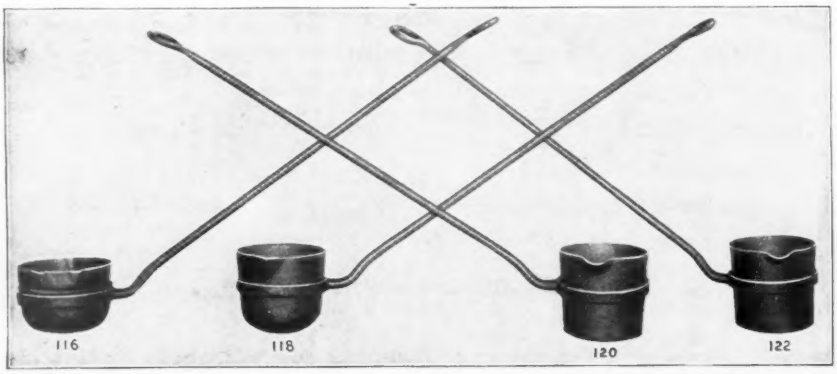

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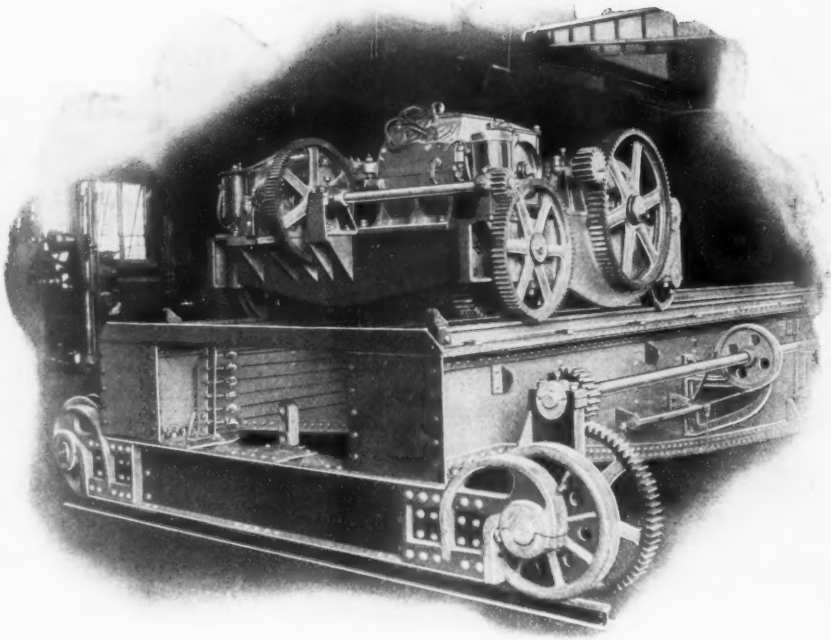

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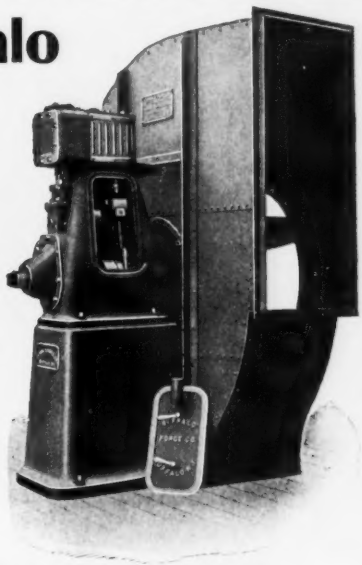

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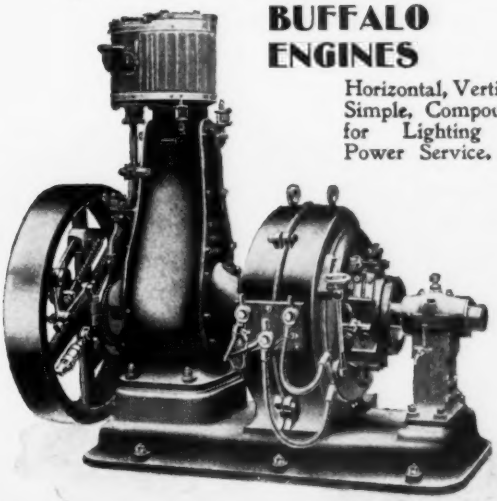

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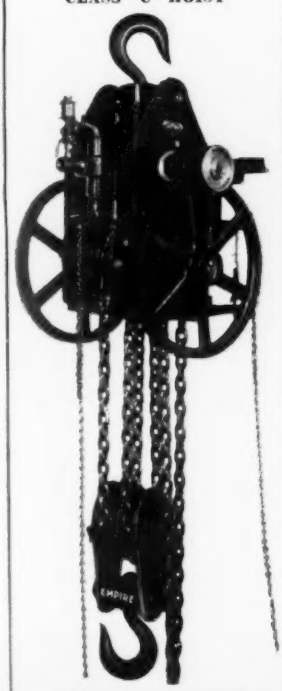

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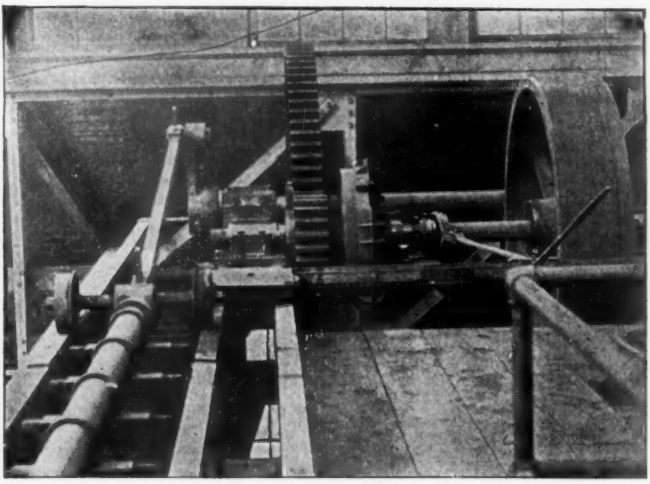

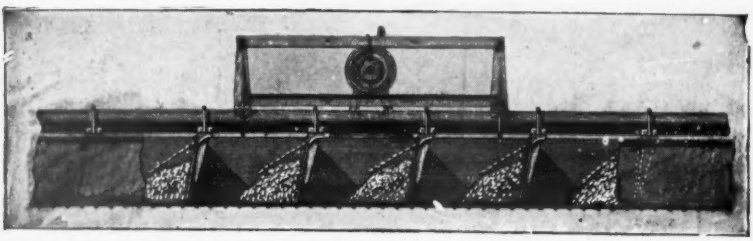

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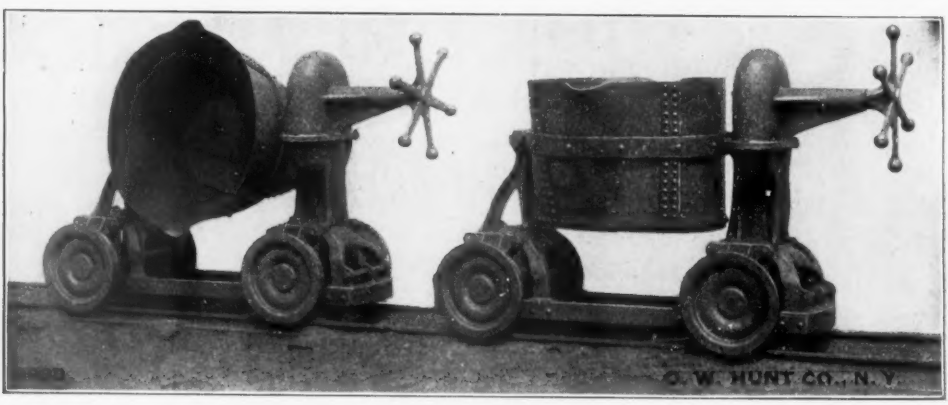

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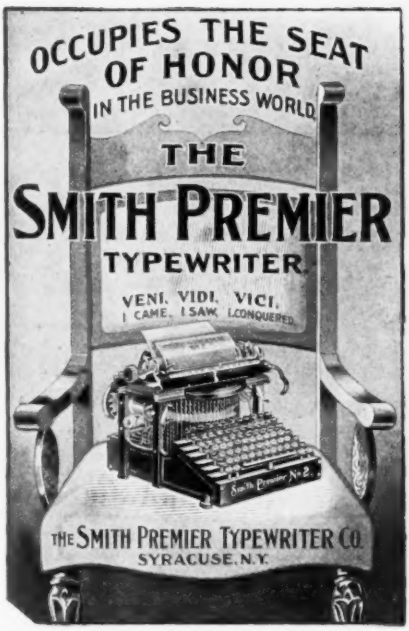

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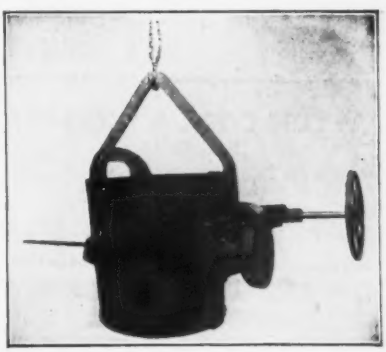

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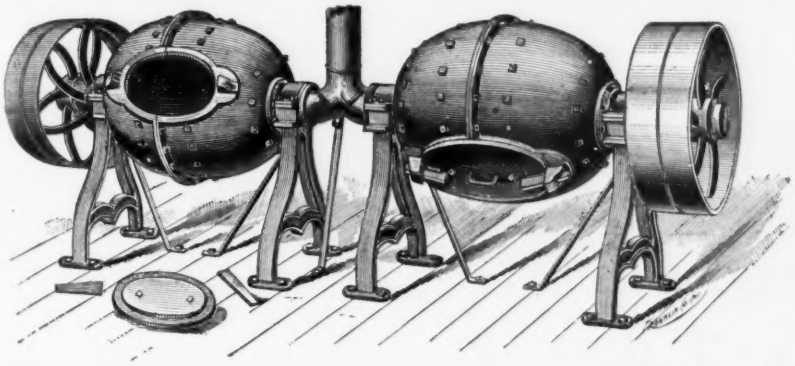

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The Stover Egg Shaped Barrel does double the work of any other, with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

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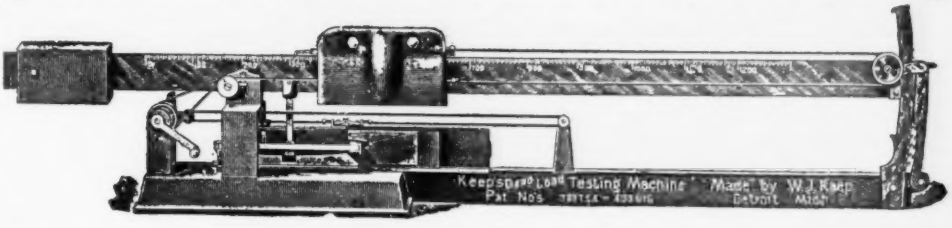

The Only Practical Method for

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AT A LOW PRICE.

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Stewart's Liquid Core Compound

LOOK AT THIS GOOD RECORD.

HOPSON & CHAPIN MFG. CO., New London, Conn.:

Have used Stewart's Core Compound for five years and shall continue to use it.

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Just made four big castings full of intricate cores. Had we used flour cores we should likely have lost two. With Stewart's Core Compound they all came out without a blemish.

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Through the use of Stewart's Core Compound, we have not only improved the quality of our cores, but it has also effected a material saving for us.

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INSPECTED FOUNDRY IRONS . . . .

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Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture?

DEAL WITH THE MANUFACTURER DIRECT.

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In making your contracts for 1901 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

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"ANTRIM,"
"ELK RAPIDS."

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

Superior Charcoal Iron Co.

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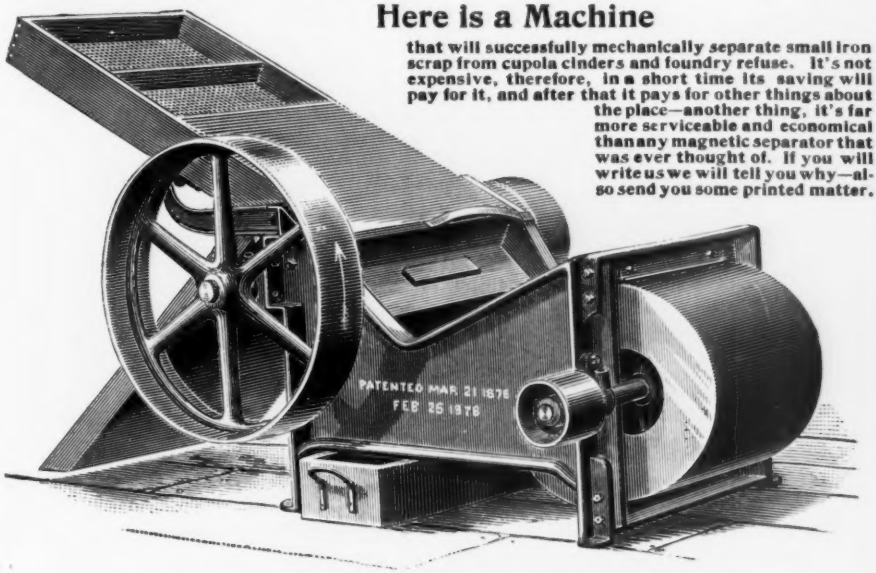
IN YOUR DUMP PILE.

WHEN YOU CART AWAY a lot of cinders and foundry refuse it's more than likely a quantity of your good iron—small scrap to be sure, but good nevertheless—goes away with it. The more you cart—the more you lose; nothing very strange about that.

Here is a Machine

that will successfully mechanically separate small iron scrap from cupola cinders and foundry refuse. It's not expensive, therefore, in a short time its saving will pay for it, and after that it pays for other things about the place—another thing, it's far more serviceable and economical than any magnetic separator that was ever thought of. If you will write us we will tell you why—also send you some printed matter.



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To test this, cast some iron around a Fanner Chaplet in an open sand mold, exposing only the protected part of the chaplet. Then take an ordinary chaplet and repeat the experiment. You will note the difference.

We have standard chaplets ready for immediate shipment. Special chaplets made to order on short notice. Our price list awaits your inspection.

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FANNER MFG. CO.,

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Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

A Good Opportunity

for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

The business has been established since 1868 and is in a paying condition.

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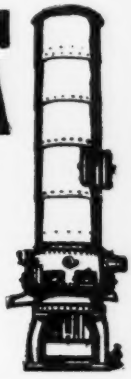

Correct Design.
Fuel Economy.
Rapid Melting.
Good Construction.
Ten Sizes.

This cupola represents all that is advanced in modern cupola design. It is the coming furnace. Let us quote you.

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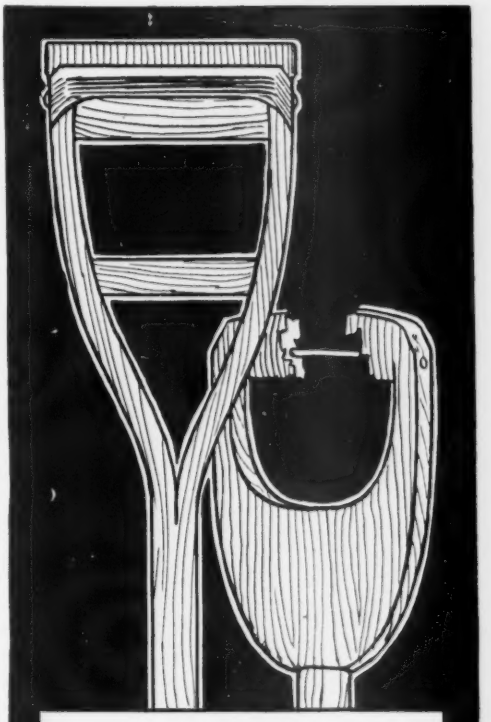

Some Handles

are made with a singleness of purpose.

Our patent ramming shovel handle serves a two-fold purpose. It dispenses with the hand rammer and prolongs the life of the shovel.

Your workmen know the advantage of a combination tool. When they get an A 1 shovel and a first-class rammer in one, they realize that their interests are being looked after.

Leave them to themselves and they will fashion their own rammers, at the expense of your shovels.

The Pro-Tek-Tor and New Century shovels are fitted with these ramming handles. The blades are made of the highest grades of steel.

A molded rubber pean in a metal socket protects the grip and serves as a rammer. The rubber surface protects your pattern from injury. It also protects the hands of the workman from splinters.

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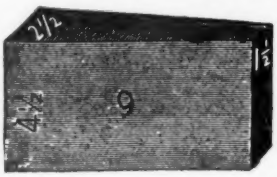

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Established 1871.

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The strongest and most open fine and medium sands in the market :: :: ::

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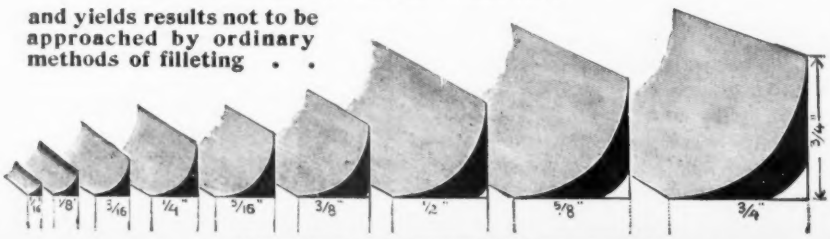

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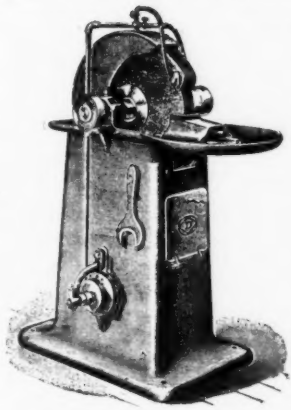

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We make five sizes of these machines, for wheels 14x2, 20x2½, 24x3½, 30x4, and 36x4. They are supplied with settling tanks, truing devices and pumps that give no trouble.

Well designed, well built and economical to use.

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For removing Scale from Iron and Steel Plates, Bars, Forgings, etc., also cleaning Iron, Steel and Brass Castings

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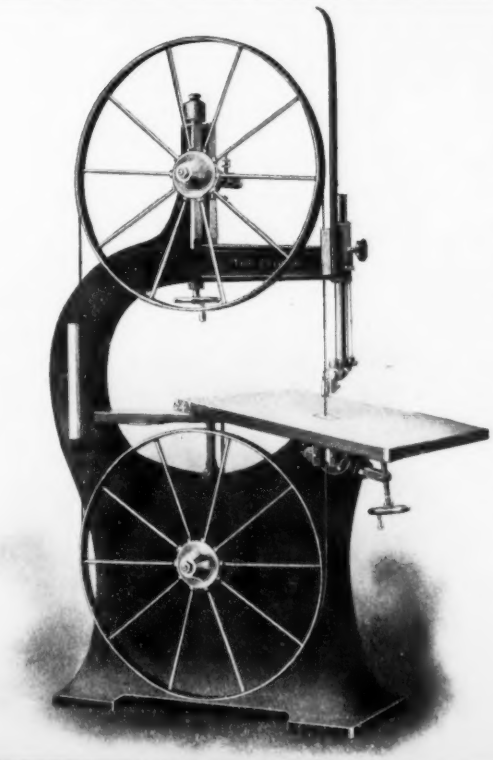

The Oliver Band Saw.

Frame is cast in one piece, and is of a cored-out pattern, thus giving the greatest strength in proportion to the weight.

Wheels are of forged steel rims with steel spokes, therefore light but rigid. Size 36 inches in diameter. Notice construction of the hub which brings path of saw directly over the bearings.

Any style **Guide** and **Guide Post** furnished.

Table is 30 inches by 39 inches, a well ribbed heavy casting. The **Tilting** device is conceded the best of its kind ever produced.

One medium width saw furnished with each machine.

Total weight 1480 lbs.

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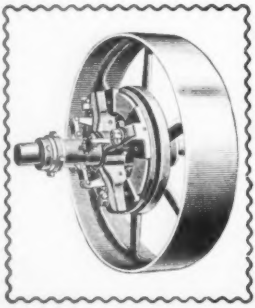

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just when you want it to and will keep doing so for years is a very useful article in any kind of a factory or foundry.

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operate just that way. That fact has been proved by years of successful service on all kinds of machinery.

Please ask us to tell you all about them.

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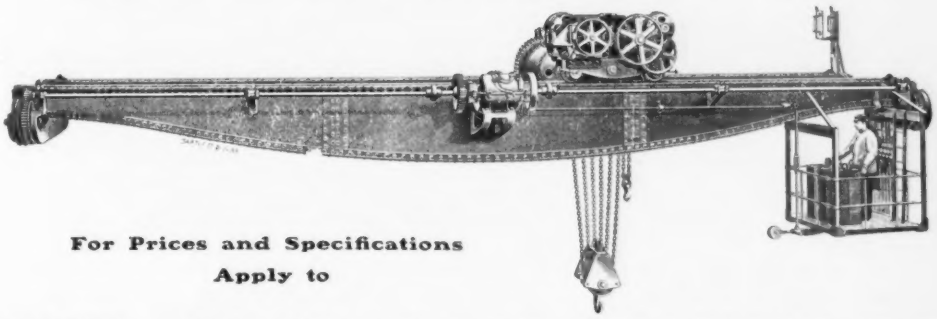
Niles Electric Traveling Cranes

Built on the Latest and Most Improved Designs.



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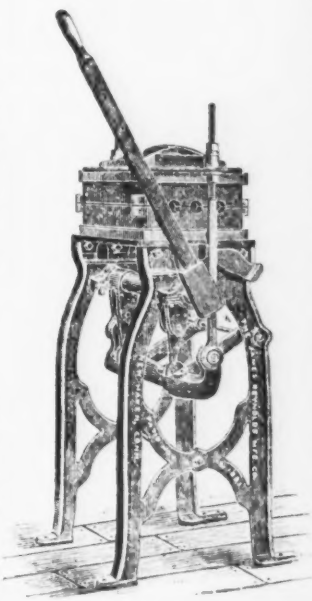

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Such appliances are now necessary to economical production.

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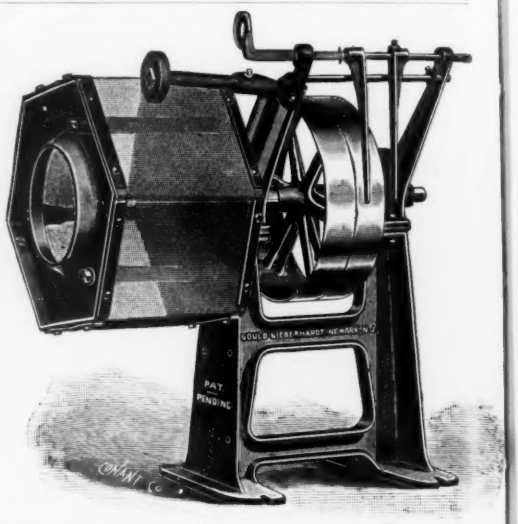

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GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

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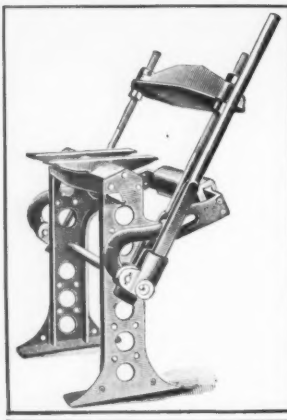

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We have been manufacturing molding machines for more than twenty-three years and **Racine** machines are acknowledged to be the most **simple, practical** and **easily operated** molding machines on the market to-day. They cost no more than inferior goods. :: :: :: :: :: :: :: ::

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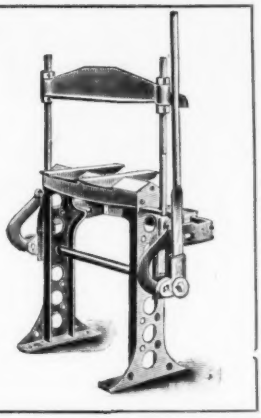

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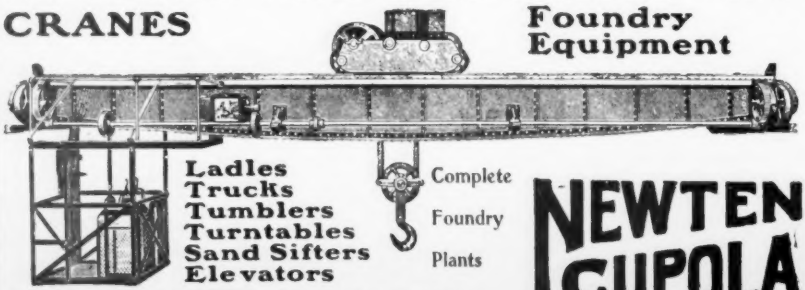

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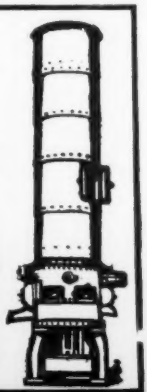

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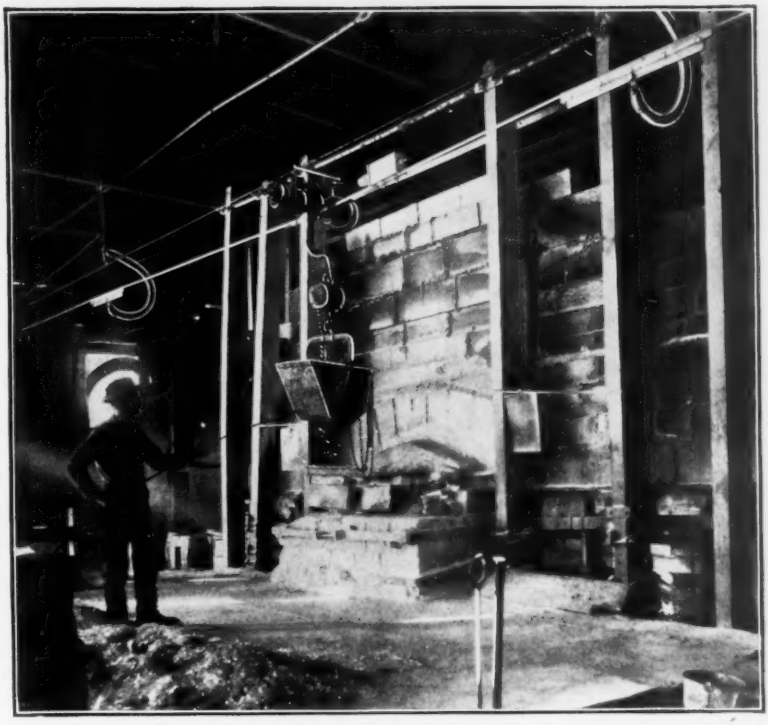

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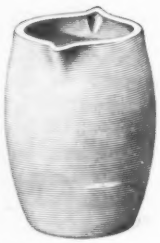

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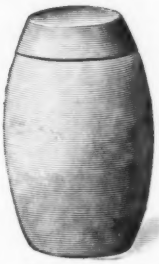

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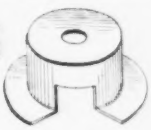
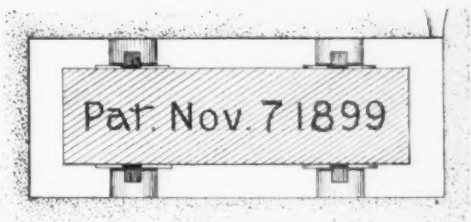
P. O. Box 84, COLUMBUS, OHIO.
P. O. Box No. 486, CHICAGO, ILL.

LOVEJOY'S PATENT  **SHELL CHAPLET**



Bristles with good points, and are money savers to all who use them.

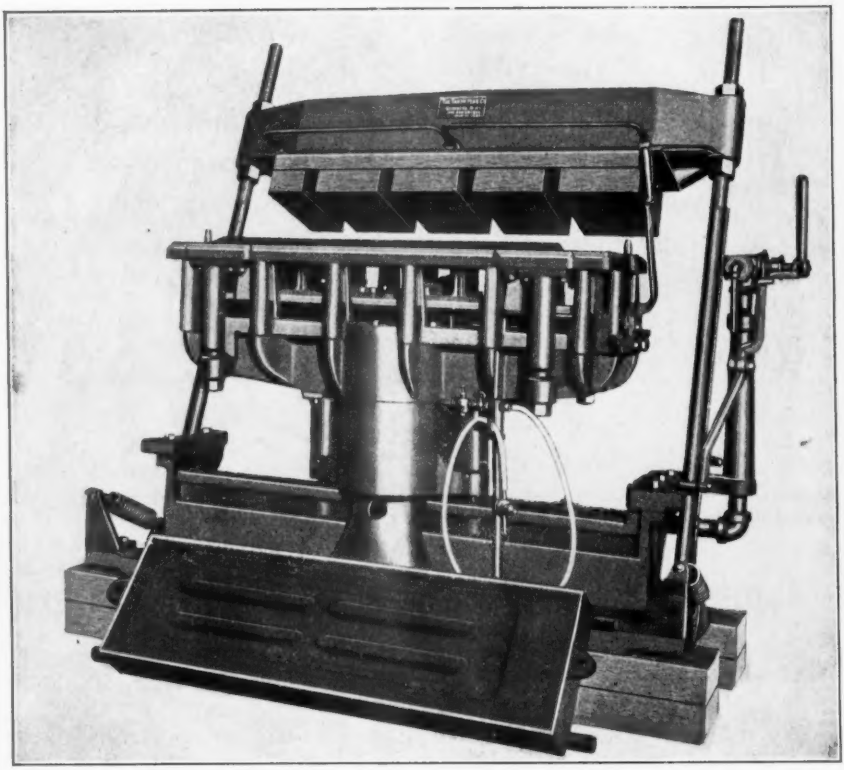
Many of the large foundries have adopted its use.

Write us, giving the thickness of metal in casting you desire to try the Chaplet with, and we will forward a trial lot without cost to you.

Manufactured by

The Patent Specialty Supply Co.
SHUSHAN, N. Y.

The Tabor



12½ x 41 IN. SPLIT PATTERN MACHINE.

Molding Machines

The Tabor Manufacturing Co.

18th & Hamilton Sts., Philadelphia.

JAMES HARTLEY & CO. OF MANCHESTER, LTD.,
38 Victoria Bldgs., London, England.

SCHUCHARDT & SCHÜTTE,
Berlin, Vienna, Brussels, St. Petersburg.

THE 20TH CENTURY RIDDLE

A PERFECT RIDDLE

The riddle for the progressive foundryman.

The sand strikes the corrugations and passes through instead of passing over. It will riddle more sand—do it easier than the old style.

The corrugations add rigidity to the bottom.

It does not cost any more than the old style and is better.

All sizes in stock in brass and galvanized wire.

Manufactured by **H. S. VROOMAN,**

18th Place and Sangamon St., - - - - CHICAGO, ILL.

MOULDING SAND

Let a man once get the idea that his goods are good enough and you may cross him right off the map. It is the alert, progressive man who succeeds. Any Foundryman who wants to improve the face of his castings ought to try my Moulding Sand. I will send him a sample barrel without charge. If satisfactory I will make a satisfactory price for a carload or more. It costs nothing to try it. It makes things look pretty smooth.

EVERYTHING FOR A FOUNDRY.

F. B. STEVENS, Detroit, Mich.

COKE

"ALEXANDRIA," High Grade, Low Sulphur FURNACE and FOUNDRY COKE.

Made exclusively from washed coal. Special care taken in grading and selecting for **FOUNDRY** use.

HIGHEST QUALITY. **LOWEST PRICES.**

SATISFACTION GUARANTEED.

WRITE

Goff, Horner & Co.

PIG IRON, STEEL, COAL and COKE

308-309-310 Lewis Building, PITTSBURG, PA.

Do You Make Light or Heavy

Dry Sand and Skin Dried Work

If So, You Should Use

McCORMICK'S VULCAN BLACKING.

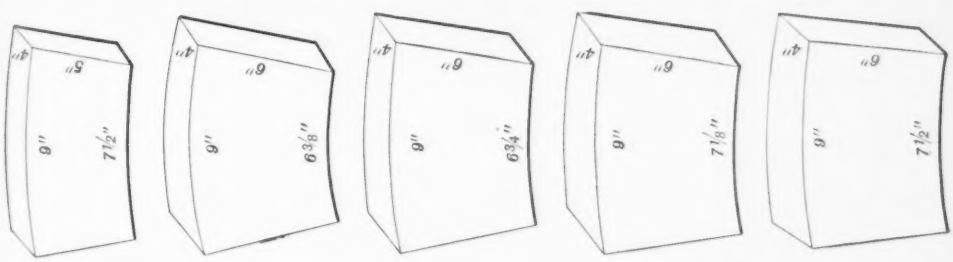
It makes as clear and smooth a casting as the best plumbago and better than the silver leads. Not an experiment—in use in the largest foundries. A trial will satisfy you of its value.

MADE ONLY BY

J. S. McCORMICK CO., PITTSBURG, PA.

"Franklin Crown" and "Sligo"

MAKE THE BEST BLAST FURNACE LININGS ON EARTH.



If that is true then they must be excellent for Cupolas, Boilers, etc. We make every conceivable shape in **Fire Brick.** Our **Fire Clay** is used almost exclusively by the large Steel Companies in the west. Send us a trial order, you'll never regret it.

The Garden City Sand Co. 3 TELS. ALL M 4827. 188 Madison Street, CHICAGO.

Record Breaking!

Last month ROGERS, BROWN & CO. issued the following, which speaks forcibly for itself:

"Breaking records has been a familiar occupation in various lines, since the memorable year 1901 commenced. We, too, have broken our record, and it was something of a record to break, for the whirl of 1899 is not far in the past. Our friends who have favored us with orders may be interested to know that we sold, on an average, in the four months from January 1st to May 1st, 1901,

5724 tons Pig Iron for every business day.
2194 tons Other Material for every business day.

7918 tons Total Sales for every business day.

"The 'Other Material' was mainly foundry and furnace coke. We may hardly hope to continue a record like this, but it is worthy of note as one of the signs of a great revival."

Rogers, Brown & Co.,

CINCINNATI NEW YORK CHICAGO
BUFFALO BOSTON ST LOUIS
CLEVELAND BIRMINGHAM SAN FRANCISCO

Rogers, Brown & Warner,

PHILADELPHIA PITTSBURG

WE ARE HEADQUARTERS

FOR THE FOLLOWING:

Cupolas, Ladles, Tumbling Mills, Core Ovens, Sand Sifting and Mixing Machines, Core Oven Trucks, Brass Melting Furnaces, Crucible Tongs and Shanks, etc., etc.

Pure East India Plumbago, Core Wash, Heavy Machine Facing, Stove Plate Facing, Car Wheel Blacking, XXX Mineral Facing, Ingot Mold Blacking, Soapstone Facing, Talc, Genuine Rhode Island Facing, etc., etc.
Sea Coal or Bituminous Facing.

Molders' Tools, Shovels, Riddles, Brushes, Bellows, Crucibles, Iron Wheelbarrows, Coke Forks, Steel Wire Cleaning Brushes, Coke Baskets, etc., etc.
Pattern Lumber, Snap Flasks, Fire Brick, etc., etc.

SEND FOR CATALOG OF DESCRIPTION.

THE S. OBERMAYER CO.

CINCINNATI, O. CHICAGO, ILL.

The largest and most reliable Foundry Supply House in the world.
"EVERYTHING YOU NEED IN YOUR FOUNDRY."

FROM THE QUAKER CITY

Sea Coal and Bitumen

These mills are at mouth of coal mines — **IRWIN**, Westmoreland Co., Pa. (on P. R. R. and Y. V. R. R.), and have a capacity of 4 cars per day.

This Facing contains but a small percentage of Sulphur, therefore has little tendency to make hard castings. (Every foundryman knows what effect Sulphur has on cast-iron.)

We make four grades :

"BOLTED" (Fine) for Hardware, Malleable Iron, Piano Plate, etc.
"NO. 1 BOLTED" for Radiators, small Agricultural Implements, etc.
"NO. 2 MEDIUM" for large and small Machinery, Car Wheels and general work.
"NO. 3 COARSE" for very heavy work.

FINE COKE FACING is also made at the Irwin Mills.

Our Quaker City Mills, Philadelphia, Pa., are running full time on Fine Facings, Plumbago, Core Wash, Core Compound, etc.

A full stock of these as well as Sea Coal and Bitumen Facing always on hand at Philadelphia for immediate delivery, also "Excelsior Bitumen" for Jobbing and Core work.

Jute and Paper Sacks and Barrels are used.

J. W. PAXSON CO.,
PHILADELPHIA, PA.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

Location and area of tuyeres insure the highest melting . . . efficiency. . . . . .

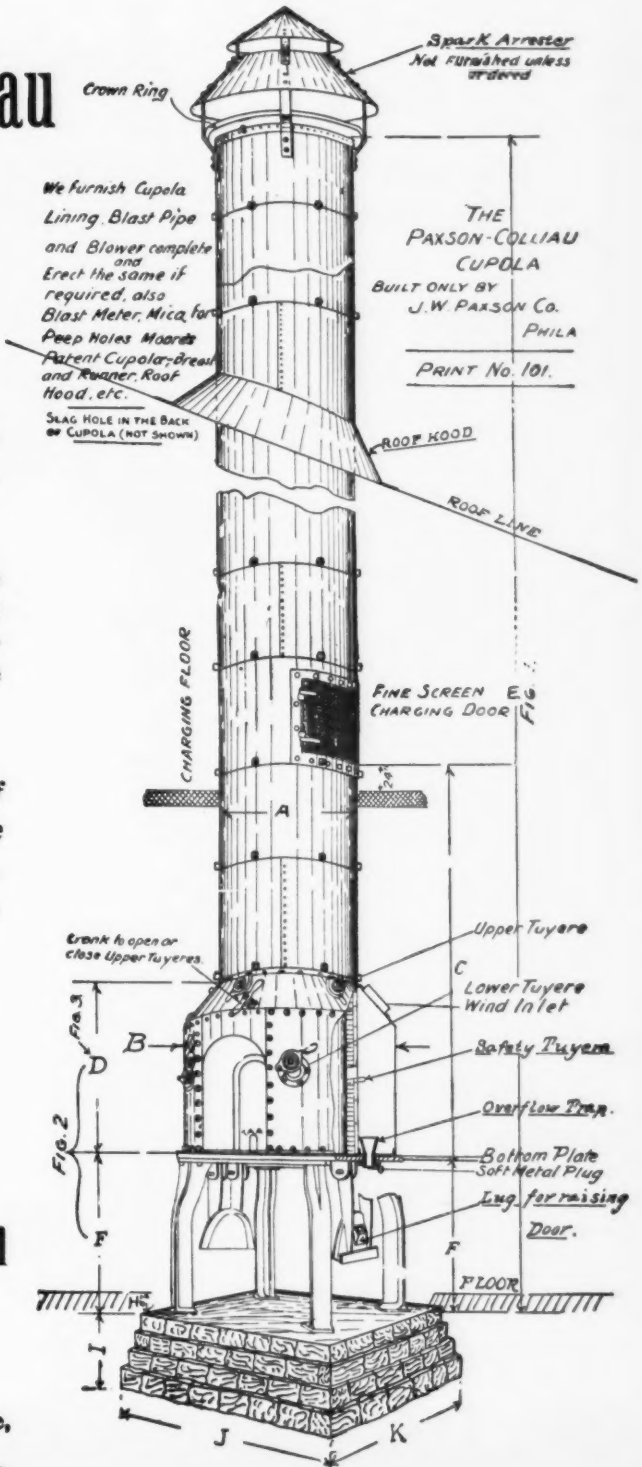
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J. W. Paxson Co.

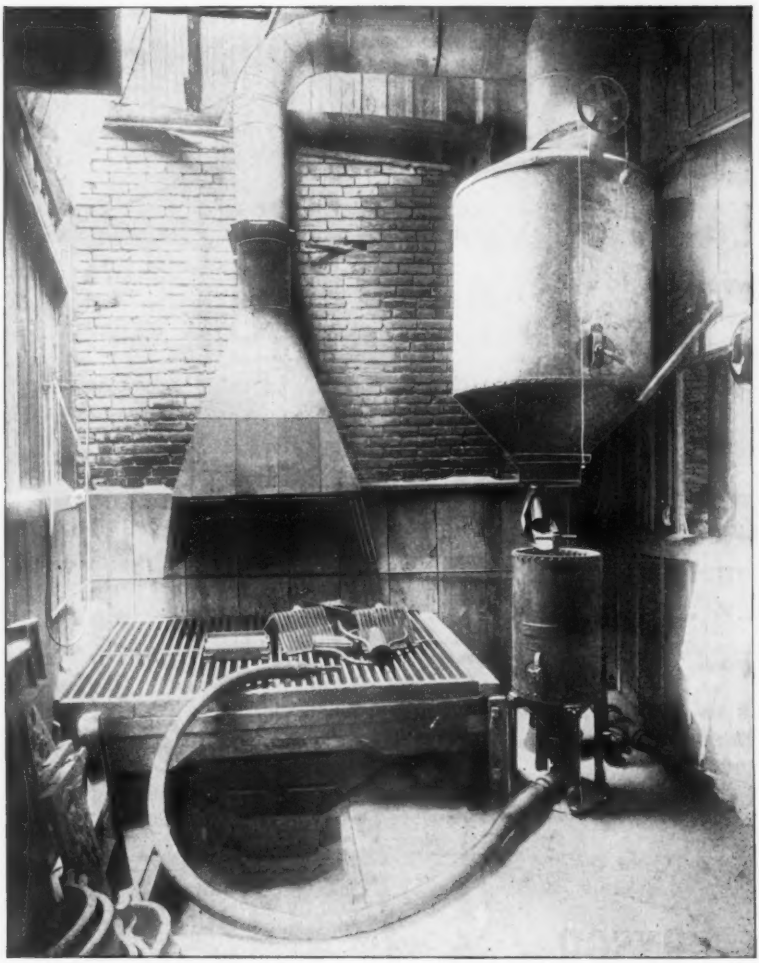
1021 . . .
North Delaware Avenue,

PHILADELPHIA, PA., U. S. A.



PAXSON-WARREN
SAND BLAST
AND EXHAUST SYSTEM, AND SAND BLAST TUMBLING BARRELS.

PATENTED, OTHER PATENTS PENDING.



CUT SHOWS OPERATING ROOM OF MEDIUM SIZED PLANT.

MADE IN THREE SIZES. SEND FOR DESCRIPTIVE CIRCULAR

APPARATUS BUILT TO MEET MODERN FOUNDRY REQUIREMENTS A DEEP AND EXPENSIVE PIT IS NOT REQUIRED.

J. W. PAXSON CO. MANUFACTURERS AND SOLE AGENTS.

PHILADELPHIA, PA., U. S. A.

GROVES' PATENT
Gear Molding Machine

(FIG. 27.)

Universal Gear Molding Machine

(GROVES' PATENT.)

The machine illustrated above is described as "universal," because it is perfectly adapted for the molding of spur, bevel, helical, staggered or worm toothed gearing (internal or external), from 6 inches to 72 inches diameter, and to 15 inches face; and this variety of work is done without any change of parts except tooth block. Floor space occupied, 9 ft. 6 in. x 6 ft. 6 in.; weight, 6¾ tons (approximately)

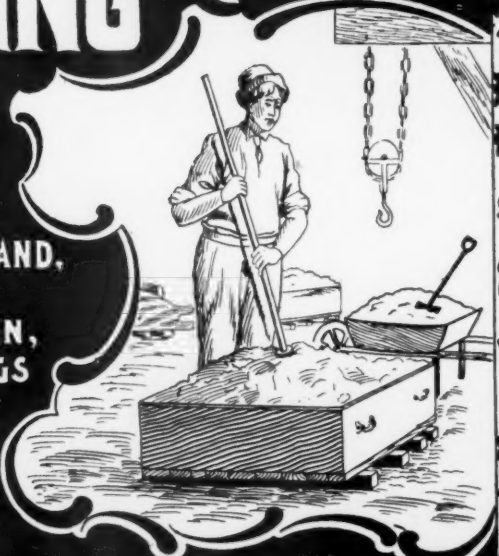
For catalog and price, ask—

J. W. PAXSON CO.,
PHILADELPHIA, PA.

WHITEHEAD BROTHERS COMPANY.

MOLDING SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.



ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
NEW YORK.

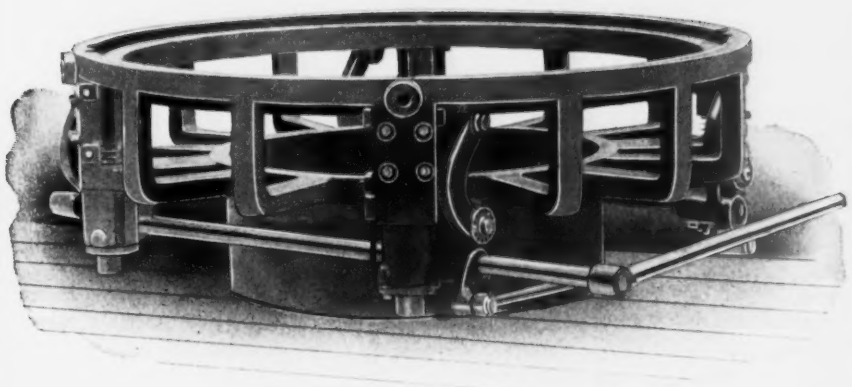
PROVIDENCE OFFICE.
42 S. WATER ST.

BUFFALO OFFICE.
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITON RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L.I.
WATERFORD, N.Y.
ALBANY, N.Y.
CEDAR HILL, N.Y.
COXSACKIE, N.Y.
CLINTON POINT, N.Y.
ATHENS, N.Y.
COEYMANS, N.Y.
WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.

PRIDMORE MOLDING MACHINES



19 DIFFERENT TYPES. 250 REGULAR SIZES.
SUITABLE FOR THE PRODUCTION OF
CASTINGS OF ANY SHAPE
OR WEIGHT.

HENRY E. PRIDMORE,

CHICAGO, ILL., U. S. A.

JOSEPH DIXON

Father of the Crucible Industry, Inventor of Dixon's Black-Lead Crucible, Dixon's "Carburet of Iron" Stove Polish, etc., and founder of Joseph Dixon Crucible Co.

Established 1827 Incorporated 1868

Dixon's Plumbago Crucibles

JOSEPH DIXON originated the Dixon Crucible in 1826. This makes 75 years of conservative and successful business. This Dixon Crucible invention revolutionized the metal melting industry. To-day Dixon Crucibles are more largely sold and used than all other kinds. Chemical analysis of material is made every day. Only the best materials are used and the whole shop is under expert practical management. As a result Dixon Crucibles run the most heats, take the least fuel, and the remark is universal both abroad as well as in the United States, that the Dixon Crucible is the standard, the best and most economical. Have you ever read our treatise on crucibles? How made and how to use them? Copy free if you would like it.

Joseph Dixon Crucible Co.

JERSEY CITY, N. J., U. S. A.

Salesrooms at 68 Reade St., New York City, N. Y. 1020 Arch St., Philadelphia, Pa.
304 Market St., San Francisco, Cal. 26 Victoria St., London, Westminster, Eng.

June, 11, 1901.

T. P. Kelley & Co.

524 West 22nd St.

New York City.

Gentlemen:

Please enter my order for 50 barrels best Ceylon plumbago.

60 barrels prepared charcoal.

Shipment to be made August 1. Prices, to be as agreed.

Yours very truly,

Manager

In passing through Detroit early in April last, I was advised to stop off at Dowagiac and see the Round Oak people, whom my friends told me were large consumers of foundry facings. I called and met the manager of the firm who gave me a sample order for Ceylon Lead and Kelly's Prepared Charcoal. I wired our house to ship promptly. Before I returned home this foundry ordered 24 Bbl. facing, 12 Bbl. Ceylon Lead and 12 Bbl. Charcoal, *same quality* as sample, quite a respectable order of this material for a stove foundry. Mr. Lee and his lieutenants must know a good thing, as the above order demonstrates.

We are now selling the best Ceylon Lead for light and heavy work ever offered to foundrymen.

Now is a good time to buy, as the price of this commodity is advancing.

T. P. KELLY,

FOR

T. P. KELLY & CO.,

NEW YORK CITY. CHICAGO.

Know What You Get.

ANYTHING can be used to fill a hole in a casting. Paint and putty will cover up defects temporarily.

But these things will not make a permanent repair. They will give you away the first time the casting gets a jolt.

Not so with SMOOTH-ON CASTINGS, that wonderful preparation, which stops leaks in anything made of iron. For fixing any defect that does not affect the strength of the casting it is simply "out of sight."

Nobody ever knows whether a casting is fixed with SMOOTH-ON CASTINGS or not. The color and general appearance of the doctored portion does not differ from the balance. The blows of a hammer cannot dislodge the SMOOTH-ON.

None of the cheap so-called cements will do this. Every last one of them will come out just when you do not want it to do so.

Therefore do not risk your good name in monkeying with unknown substances. Stick to SMOOTH-ON and SMOOTH-ON will stick to your defective castings.

Send for some literature on the subject of mending castings, and order a sample can at the same time. SMOOTH-ON is not sold in bulk.

CHEMICAL ANALYSIS

is the only guide to the true composition of material. If you are in doubt as to the value of your raw material, have it analyzed; we are helping many foundrymen, can we assist you? We have a little booklet that tells the cost and shall be glad to send you a copy.

SMOOTH-ON MFG. CO.,

Analytical and Manufacturing Chemists,

547-549-551 Communipaw Avenue, JERSEY CITY, N. J., U. S. A.

VREELAND TOMPKINS, Chemist and Manager.

WE WANT MEN

Who are practical in the foundry business to send to us for a trial barrel of

CORONA PLUMBAGO.

It is far superior to every brand of adulterated Plumbago, East India, Silver Lead or Graphite, for general run of green sand castings. The price is as cheap as good bag facing.

RADIANT SILVER LEAD

Is a standard for medium price lead. It has the advantage of fifteen years' test.

A. A. PLUMBAGO

Is all alone in the front row as a LOW PRICE, HIGH CLASS PLUMBAGO for fine machinery castings.

C. F. M.
FOUNDER'S PERFECT WASH

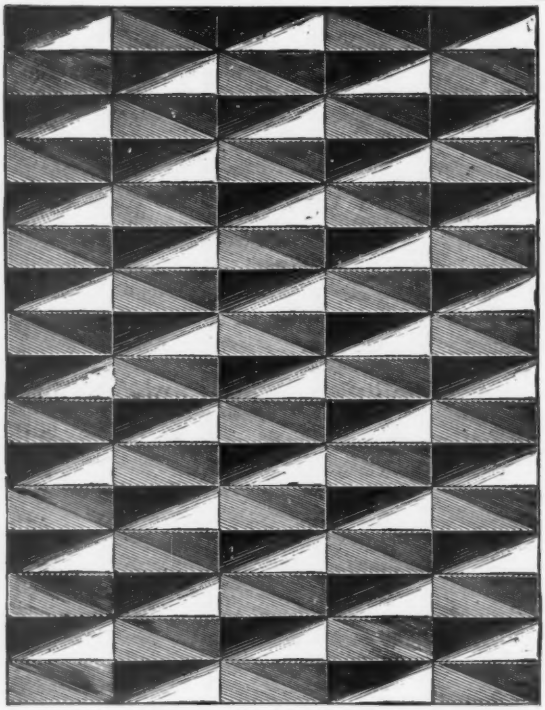
Never has been equaled for DRY SAND WORK. This was the FIRST PERFECT WASH. There are a number on the market, BUT NONE THAT EQUALS C. F. M.

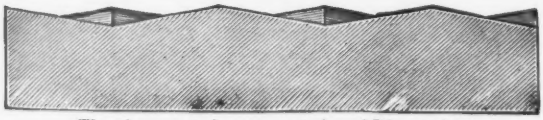
You would order that set of PERFECTION CORE BOXES, if you only knew what the delay is costing you.

EVERYTHING FOR THE FOUNDRY.

The J. D. Smith Foundry Supply Company,
Cleveland Facing Mill,

CLEVELAND. CINCINNATI.





The above cut shows exact size of Diamonds.

DIAMOND PATTERN LUMBER,

—FOR—

DOOR SILLS, PLATFORMS, STEP PLATES, ETC.

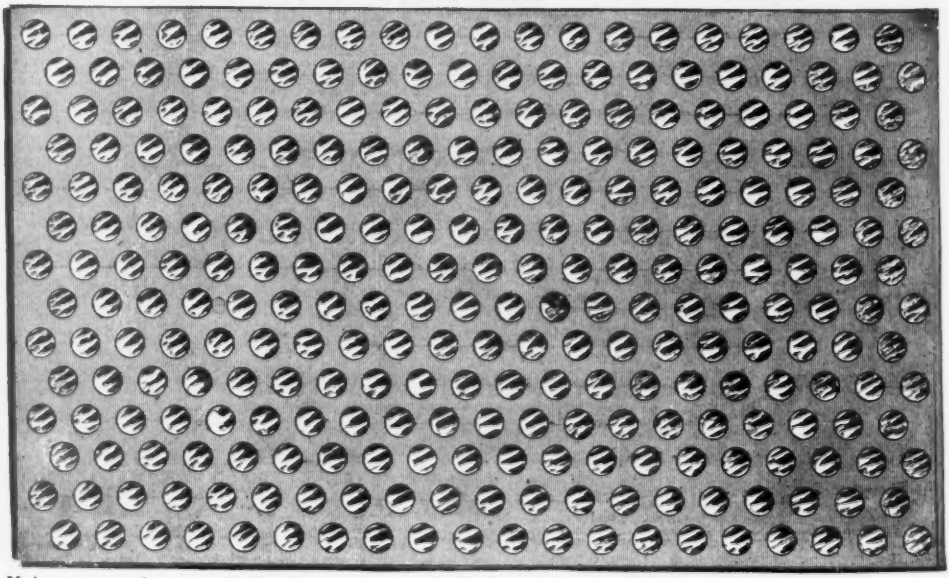
This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide, and ½ inch thick. Send for sample.

BROWN BROS. MFG. CO.,

Cor. Clinton and Jackson Sts., Chicago.

PRISMATIC SIDEWALK LIGHT TILE.



Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

BROWN BROS. MFG CO.,

Cor. Jackson and Clinton Sts., CHICAGO.

WATERFORD

MOLDING SAND

(NEAR CHICAGO)

Exhausted in the EAST and like RIP VAN WINKLE, AWAKES after many years in the WEST.

By a scientific Geological Report as to formations, deposits, etc., these sand beds are identical with the EAST.

40 Years

Constant use locally

MASTER VAN DYE,
Our Commercial Tourist,

Representing this, one of the most important of our **MANY SANDS** COMPOSING OPEN, FINE, MEDIUM AND COARSE MOLDING, AND COARSE CORE SANDS

Not only HIGH GRADE, but LOW PRICE,
CHICAGO, SOUTH-WEST and NORTH-WEST

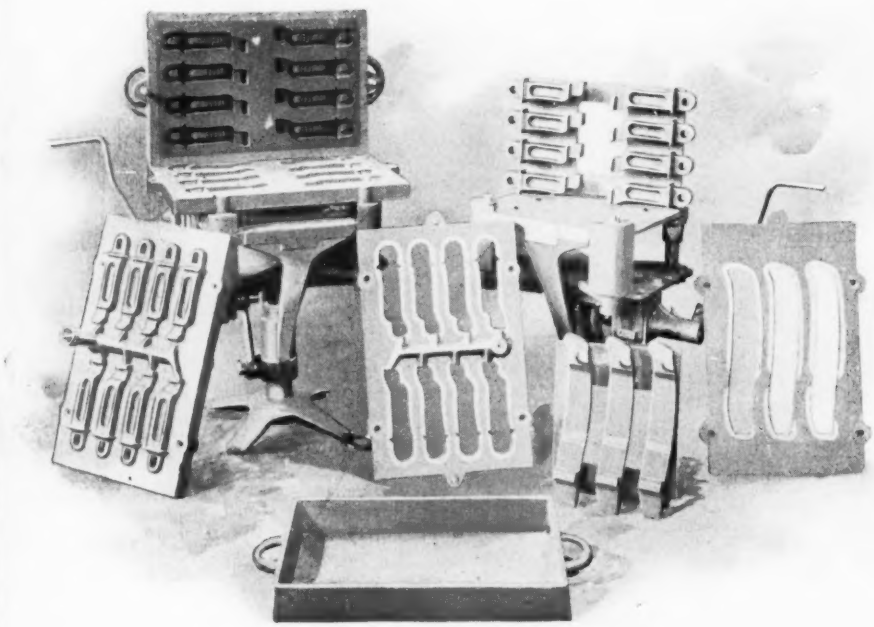
The Newport Sand Bank Co., NEWPORT, KY.

Branch Office: 113 Adams Street, CHICAGO, ILL. Phone Central 2791

Machine Molded Castings

are more perfect than those made by hand. They are uniform in size, and where castings must be made within small limits of variation, are the only ones which give satisfaction.

Perhaps you have several jobs which are now giving you trouble or from which you desire a greater output. If so, send us a sample casting and we will give you an estimate of what it will cost you for an outfit which will do more and better work.



A MAYWOOD MOLDING MACHINE.

Some foundrymen entertain the idea that molding machines can only be used to advantage where castings are wanted in unlimited quantities. This is a mistake. By our method of fitting up patterns, the same machine may be used for several jobs, the changes being made with but little loss of time.

The **MAYWOOD PNEUMATIC RAMMER** is designed for shops which desire to reduce the cost of their sand pounding. With it one man will do as much as four men can do by hand and do it much better.

Write us for our catalogue of labor-saving devices.

Maywood Foundry & Machine Co.

MAYWOOD, ILLINOIS, U. S. A.

A Great Many Cores

are used every day by the Rensselaer Mfg. Co., of Troy, N. Y. Here is what they think of the **Millett Core Oven:**

THE MILLETT CORE OVEN CO., Brightwood, Mass.:

Gentlemen:—We are glad to be able to recommend so worthy an object as the Millett Core Oven.

We have had ours in use a number of years and consider it the most perfect thing in its line that we have ever seen.

We have never had the least trouble with ours; never a broken hinge, casting or anything about the oven that has failed to give perfect satisfaction, from the day it was put in until now.

The economy of fuel used in not being obliged to enter the oven and thus cooling it off every time the doors are opened, to say nothing of the convenience to the men when baking small cores constantly during the day, is the feature that recommends your oven above anything that has been produced thus far. We do not see how any foundry who are using any amount of cores, and expect to be in existence beyond four or five years, can fail to look into the merits of your oven and act accordingly. Trusting that you will have abundant success in its sale, which so worthy an object deserves, we remain,

Yours truly,

RENSSELAER MFG. CO.

Ellis L. Rowe, Sec. and Treas.

Pretty good recommendation for the **Millett Core Oven,** is it not? We could not have made stronger claims in its favor had we written this letter ourselves. If you haven't got a **Millett Core Oven** in your shop, your core department is not perfect.

Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at { THE S. OBERMAYER CO., Cincinnati and Chicago.
and for sale by { THE J. W. PAXSON CO., Philadelphia.
J. W. JACKMAN & CO., 39 Victoria St., London, S. W., England.

About Pig Iron

HAVE you noticed the market reports lately? If so, you are probably aware that choice brands of foundry irons are scarce.

Choice brands means reliable brands, irons which are uniform in quality from one end of the year to the other. Such a brand is the **Cherry Valley Iron.** It has been the standard foundry iron for many years.

No better foundry iron than the **Cherry Valley** can be made. Our ores are all carefully selected, our own coke ovens furnish us the very best of fuel. When you unload a car of **Cherry Valley Iron** in your yard you may be sure that it is just the iron you have ordered.

We should like to furnish you your **good iron** and wish you would write us concerning your requirements in the immediate future so that we may prepare to take care of you.

The Cherry Valley Iron Company

Murtland Building, Pittsburg, Pa.

Roots' Positive Pressure Blower

ALWAYS THE STANDARD

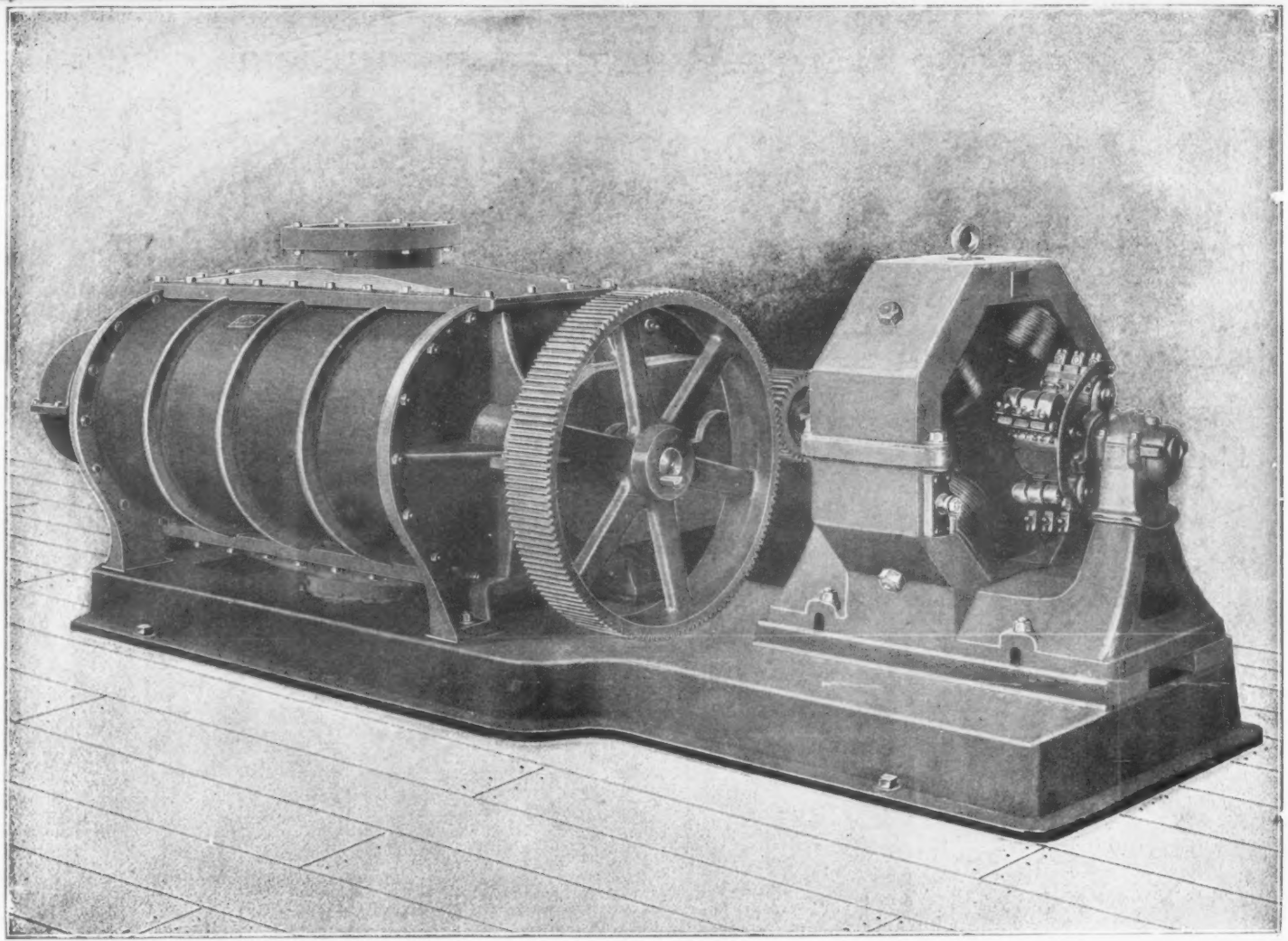
Established 1859.

The ROOTS obtains the minimum of friction and the maximum of efficiency Others cannot—do not

P. H. & F. M. ROOTS CO.

HOME OFFICE AND WORKS,
CONNERSVILLE, INDIANA, U. S. A.

NEW YORK OFFICE, 109 Liberty Street.
CHICAGO OFFICE, 1538 Marquette Building.
PITTSBURG OFFICE, F. R. Dravo & Co., 812 Lewis Block.
CLEVELAND OFFICE, F. R. Dravo & Co., 707 New England Building.



ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR.

A Blessing to Brass Founders

The majority of brass founders use more or less scrap. They have to.

In doing so it is difficult to obtain a pure brass casting. This is because iron in the form of filings, or small screws, will find its way to the melting pot, causing a great deal of trouble.

We were bothered the same way for many years. We experimented and succeeded in producing a **Metal Purifier,** which we guarantee will remove all impurities, such as iron and similar substances, from brass, when melting.

Not only will our **Metal Purifier** make the old stock as good as the new for casting purposes, but it will also preserve the life of the crucible, while other materials used as a flux tend to destroy the crucible.

Another strong point in favor of our **Metal Purifier** is that it increases the strength of cast brass fully thirty per cent.

We sell our **Metal Purifier** in kegs of 100 pounds at 7½ cents per pound. Barrels containing 500 pounds may be had at 6 cents per pound, F. O. B. Chicago.

We guarantee our **Metal Purifier** to give perfect service, every pound of it. Prominent brass founders throughout the country use it. A trial order will have prompt attention.

The up-to-date brass foundry uses our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We carry a stock of the best makes of Crucibles at the lowest prices.

We also make a specialty of supplying brass foundries with Scrap Metals of all kinds at the lowest market prices, put up in crucible shape, if so desired.

Swarts Metal Refining Co.

SMELTERS AND REFINERS

Main Office and Works, 18-20 N. Desplaines St.,

ESTABLISHED 1885.
INCORPORATED 1895.

CHICAGO, ILL.

ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR

It Hangs

AYERS' ZANESVILLE MOLDING SAND holds together. Your molders by using it will not have to nail every corner of the mold as they have to do with other sands. It has strength and long life, combined with sufficient porosity to do away with most of the venting generally done.

Ayers' Zanesville Sand comes in all grades to suit any class of work, from the finest brass to the heaviest machinery castings. The supply is plentiful, the shipping facilities the very best, and taking everything into consideration, it is the cheapest molding sand a foundryman can use.

Ask us for prices delivered in your town. We can give you the very best of service now, therefore do not delay your order until fall, when the car supply is short.

E. M. Ayers,

Zanesville, Ohio.

The EFFICIENCY of a BLOWER

depends upon THE WAY it is

INSTALLED

and

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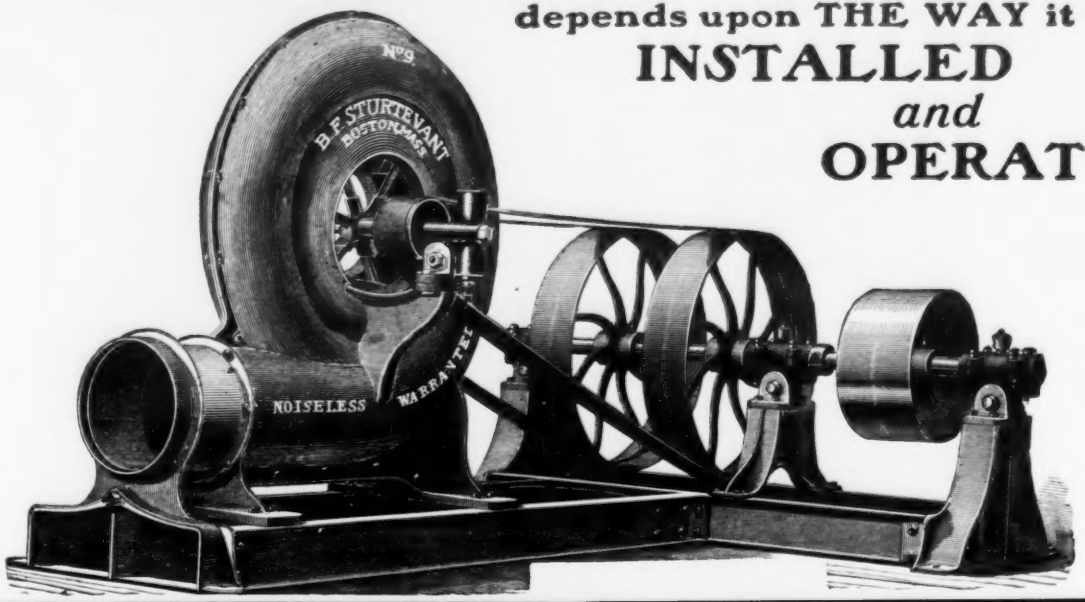

Small pipes, sharp turns, and high speed are reckless robbers of power. We make it our business to protect you by giving the benefit of our 40 years' experience and design your blower arrangements if you desire. :: :: :: :: :: :: ::

199

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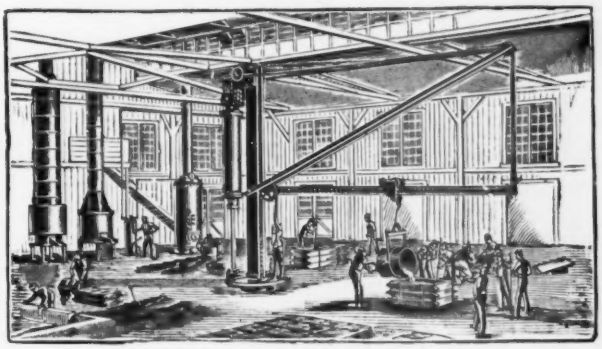
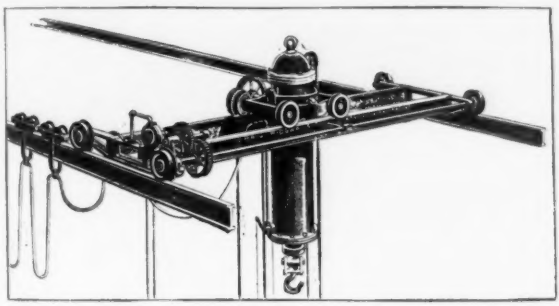
"Jes' fer Instance"



5-ton Steam Hydraulic Crane in a Foundry.

Once in a while we open our order book to show who get Ridgway Steam Hydraulic Machinery. At the present moment, among many others, we are making cranes or elevators for the following ten concerns.

The striking thing about these is that every one of them is a big A little a concern, rated in the millions. Get your Dun or Bradstreet and see. We venture to say that scarcely another shop can show ten such concerns as customers at the same moment. It certainly speaks wonders for Ridgway Machines, don't it?



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We are proud of this lot of customers and we don't need to say another word of advertisement.

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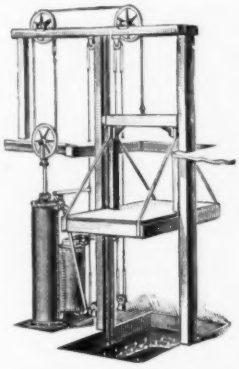
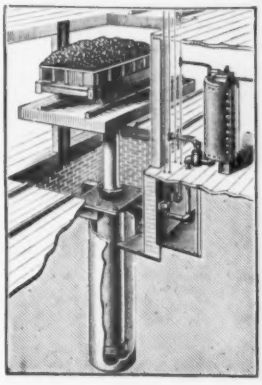


The public is finding out the Ridgway Hoist, and our only problem is getting them made.

If you are wise you will get them, provided we can meet your views on delivery.



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Smart People Do.

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MODERN FOUNDRY MACHINERY

SAND MIXER

Not an Experiment

PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand,** we have issued a small pamphlet which will be sent on application.

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Correspondence is Solicited.

Over 16,000 in Use.

ALWAYS READY!

800 TO 4,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to all Railroads and Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G CO.,

EDWARD ROBINSON, Sole Proprietor.

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ROSS-MEEHAN FOUNDRY CO.
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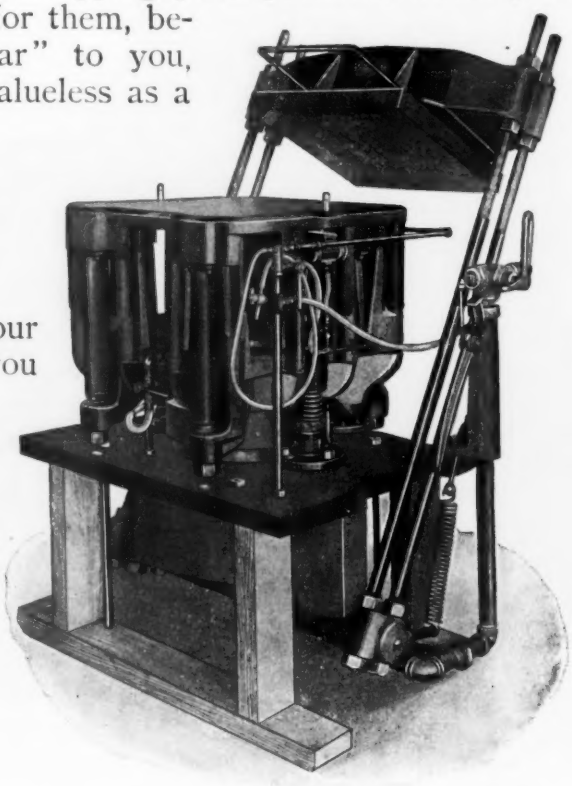
The Wells Light M'f'g Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y and Treas.

TABOR MOLDING MACHINES

If you want Power Ramming Molding Machines—machines which do all the work except putting in the sand, setting the cores, and pouring the metal—and if you are not fond of filling catacombs full of expensive stripping plate patterns, which you keep, once you have paid for them, because they were so "dear" to you, though they may be as valueless as a departed mother-in-law,



BUY TABOR MACHINES

If you just want to use your wooden patterns quickly, you can stick them on our Paraffined Wooden Plates, and draw them with our Vibrator, if you

BUY THE TABOR

If you have a lot of gated patterns, which hand-rapping is continually knocking to pieces, you can save pattern repairs and get to machine molding of the highest class, by using our Vibrator Frame system, so

BUY A TABOR

Write us for the latest truths about Machine Molding.

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SCHUCHARDT & SCHUTTE,
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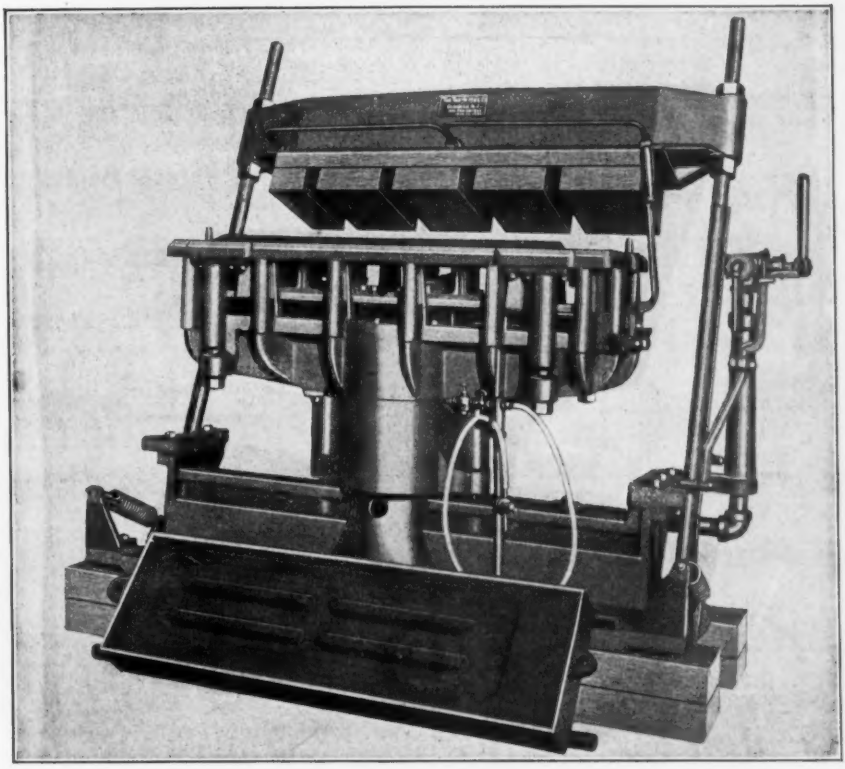

12½ x 41 IN. SPLIT PATTERN MACHINE.

Molding Machines

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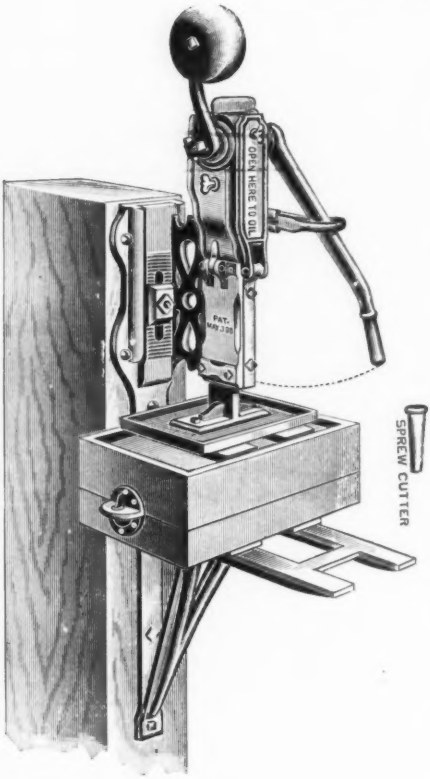
W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts.

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

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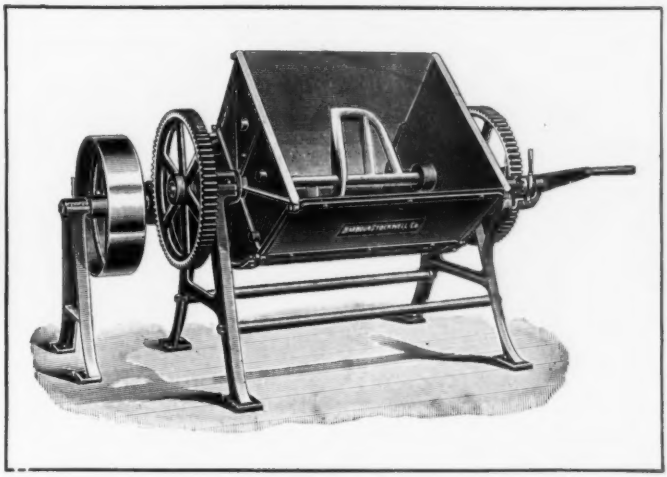
J. W. JACKMAN & CO.
Sole European Representatives, London, S. W., Eng.

Boston Foundry Mixer.



DRIVEN BY BELT OR BY MOTOR.

By its use you have a better mixed core-sand and facing at one-half the cost of that mixed by the old methods.

This Mixer is in use in many of the largest Foundries in the United States.

On Exhibition and For Sale by . . .

THE S. OBERMAYER COMPANY,

18th and Rockwell Streets, CHICAGO, ILL.

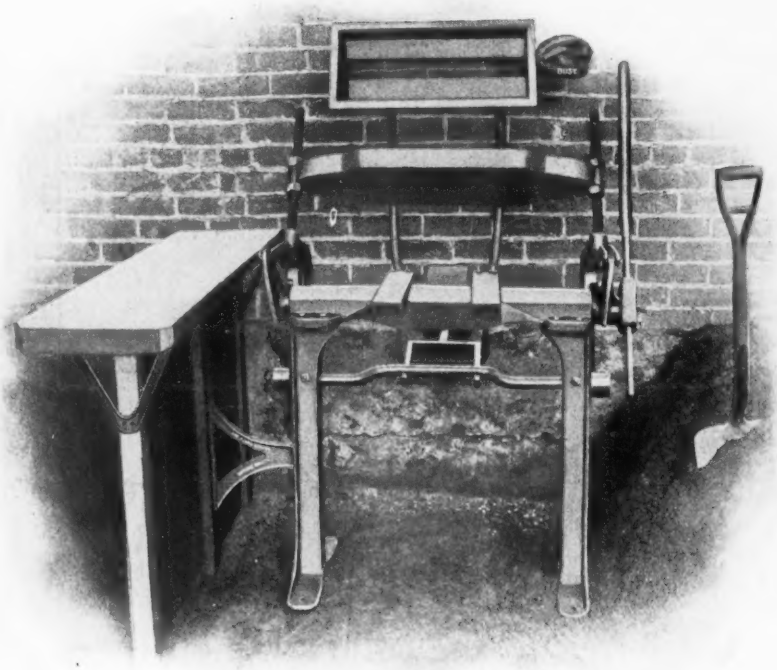
FOR PARTICULARS REGARDING OUR MIXER AND SAND SIFTERS, WRITE

BARBOUR-STOCKWELL CO.

205 Broadway, CAMBRIDGEPORT, MASS.

The Farwell Molding Machines

SEND FOR CATALOGUE



Patented Dec. 21, 1897, and Nov. 22, 1898.

The above cut shows the Farwell Molding Press with double Tool Shelf and Dust Bag Holder. Also Long Side Shelf to hold match, flask, etc., under which is a partition to divide the floors. Other styles and sizes shown in our catalogue which will be sent on request.

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THE ADAMS COMPANY,

Dubuque, Iowa, U. S. A.

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NEWEST.

Thousands in Use Everywhere.

Guaranteed Perfect.

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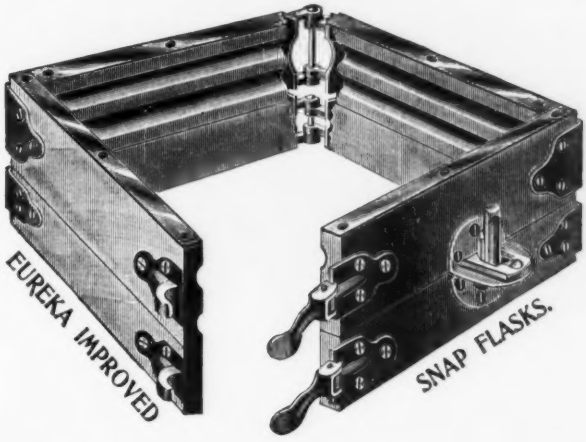
for brass foundries and wood flasks for iron foundries are guaranteed accurate. We make all sizes and kinds and you cannot get better. Send for our catalogue—it contains articles you need and which we can sell you at the most favorable prices.

WOOD FLASKS FOR IRON FOUNDRIES



Brass Founders Supply Co., NEWARK, N. J., U. S. A.

The Hanna Portable Pneumatic Screen Shaker.

Notice what this Foundryman says of the STEAM-DRIVEN SCREEN SHAKER:

WILLIAM FERGUSON Pres. HERMAN O. LANGE Sec'y AND Treas.

THE WILLIAM FERGUSON FOUNDRY CO.

HIGH GRADE CASTINGS, LIGHT & HEAVY

Clybourn Avenue and Willow Street.

TELEPHONE NORTH 74

Chicago, March 23,1901.

E. E. Hanna, Esq.,

Chicago, Ill.

Dear Sir:-

The two Screen Shakers furnish by you have now been running for over 30 days and we find them doing everything you claim for them.

One man makes all the facing for 20 molders with one machine and the other machine has dispensed with the labor of one man in the Core Room. They require no attention other than the usual oiling required by any machine. The machines pay for themselves in the saving of labor in a very short time.

But the other advantages, by the use of your machines, are even much greater than the direct saving of labor. The sand is in much better condition than it could possibly be by hand shaking, and the use of your machine to a certain extent contributes to uphold and have more system in the foundry. All foundrymen know how difficult and desirable that is.

Yours truly,

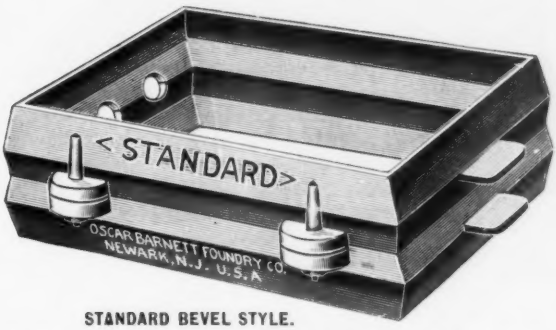
THE WILLIAM FERGUSON FOUNDRY CO.
William Ferguson PRES'T.

For further information address **E. E. HANNA,** **751 Cullom Ave., CHICAGO,**

OR

THE S. OBERMAYER CO., Cincinnati and Chicago.

COMPLETE EQUIPMENT
for BRASS FOUNDRIES



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FLASKS, FURNACES, DRYING STOVES,
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TONGS, CRUCIBLES, ETC.

ALL FLASKS ARE GUARANTEED INTERCHANGEABLE
WITH ANY OSCAR BARNETT
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FLASKS OF SAME SIZE MADE IN
THE PAST FORTY-FIVE YEARS.

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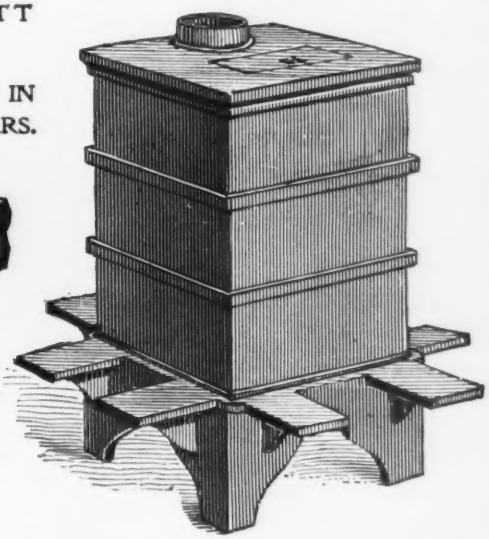
SPECIAL FLASKS FOR MACHINE
MOLDING MADE TO ORDER AT
REASONABLE PRICES



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FOUNDED 1845. NEWARK, N. J., U. S. A.

ESTABLISHED 1875.

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BINGHAMTON, N. Y.

Inventors and oldest manufacturers
in the world of the

STOW FLEXIBLE SHAFT

FOR ALL PURPOSES.

PORTABLE EMERY GRINDER

When your castings are too heavy to comfortably handle, isn't it good shop practice to

TAKE THE TOOL TO THE WORK instead of
THE WORK TO THE TOOL?

Thousands think so and use this Emery Grinder. VERY CONVENIENT IN YOUR ERECTING DEPARTMENT for grinding off imperfections previously unnoticed.

We should be pleased to send you Catalogue and quote you prices.

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85 Queen Victoria St., London, Eng.

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Chicago Fire Brick Co.

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EAST INDIA PLUMBAGO,
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SILVER LEAD,
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CUPOLA BLOCKS, SPECIAL SHAPES,
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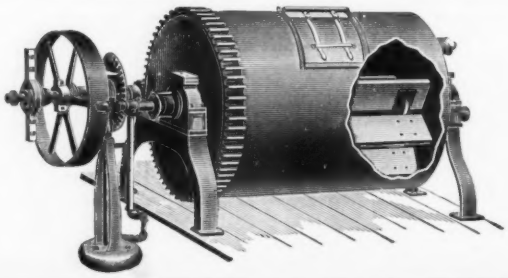

THE WHOLE THING IN ONE MACHINE.

One machine to buy. One machine to operate. One machine to furnish power for. One machine to keep in repair. One machine to take the place of two and do twice the amount of work of both.

One machine saves two handlings. One machine, and the only one that can recover and return to you, clean and bright, free from all sulphurous cinder, all the metallic iron, great and small, in your cupola dump and foundry waste.

If you don't want the fine shot contained in your foundry waste, what is the sense of using a separator to catch it and then using a riddle to sift it out?

Just make your stave mill tight enough to retain it as fine as you want, and you have no use for the separator. You have to use the stave mill anyhow to grind the cupola cinder for any of the separators.

Sly's One Machine Cinder Mill handles double the amount of cinder possible for much larger stave mills, hence a saving of half the power, and it gives you the iron and coke all separated for the labor of shoveling the cinder and scrapings into the mill.

Up-to-date foundrymen have learned that a pound of the finest of this shot is worth a pound of sprue, and when secured by the washing process cannot produce hard knots in castings, neither does it burn up in the cupola, as many suppose.

The little stream of iron from the melting mass falls on the coke in the bed and spatters into fine shot, gather and find their way to the bosh.

Why don't those fine particles burn up, too? The fact is the most careful tests have shown that this material is as valuable as cleaned sprue, and no foundryman can afford to ignore the fact.

The prejudice against fine shot iron is due to the old processes of recovering it. The old stave mill, still in common use to prepare the cinder for all separators, is very liable to enamel the fine iron so that it cannot unify with the mass in the bosh, and it goes into the mold, shell and all, as it is very frequently found in machining castings.

Every process for recovering iron from foundry waste, save the washing process, also, gathers with the iron more or less cinder composed of iron, sulphur and other elements in chemical union which no foundryman wishes to put into his cupola.

W. W. SLY,

110 Elm Street, Cleveland, O.

EXPENSIVE POWER :: ::

When you move the stuff in your shop by human strength you are using the most expensive power there is.

You now have a gang of laborers to carry out castings, flasks, etc. There is another lot of laborers busy carrying in coke, iron, molding sand, etc. About all the facilities you have given them is a wheelbarrow or an old truck that it takes a horse to move.

For a very few dollars you can put a **COBURN TROLLEY TRACK** into your plant reaching to all departments. Half of the laboring force you now have can then be dispensed with.

The trolley track route will bring in or take out anything of light or medium weight. Your molders will be served more promptly and find less excuse to stand idle.

You can hang an air hoist on the **COBURN TROLLEY TRACK** if you want to. The same men will do more work when they do not have to wear themselves out lugging things around.

The leading shops are buying **COBURN TROLLEY TRACKS.** Can you afford not to be as well equipped as they are?

If you will send us a rough sketch of the way your plant is laid out, we shall be pleased to give you an estimate of what it will cost you to become as well fixed as the other fellow.

COBURN TROLLEY TRACK MFG. CO. :: :: ::

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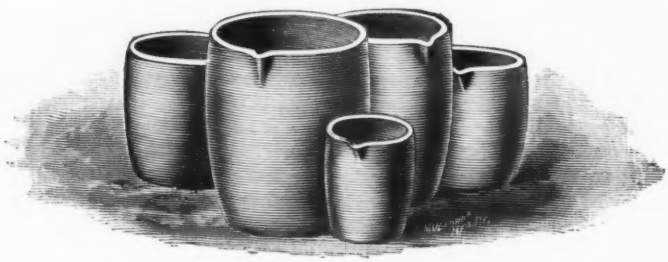
BRIDGEPORT CRUCIBLE CO.

MANUFACTURERS OF

BLACK LEAD CRUCIBLES



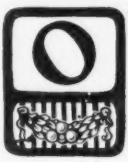
CLIMAX FURNACE CLAY

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U.S.A.

WHEN YOU WANT THE BEST FOUNDRY SUPPLIES

There is to be had, come to us. We are not giving these away, but we do sell them at a very low profit.



UR plant contains nothing but the latest machinery. It has the greatest capacity of any facing factory in the world.

Hence our motto: "No orders too large for our capacity; none too small for our best attention."

We are always glad to be of service to foundrymen, whether they purchase their supplies from us or elsewhere. Write us on any matter connected with your shop.

The Hill & Griffith Company

CINCINNATI, OHIO, U. S. A.

Importers and Refiners of Graphite and Ceylon Plumbago for all Purposes

Foundry Facings, Supplies and Complete Equipments

ESTABLISHED
1888

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FOUNDRY
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For Stove Plate,
Brass,
Malleable, Car Wheel,
Core, Sharp
and Extra Heavy
CASTINGS

Mines
in
Missouri,
Illinois,
and
Iowa

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It's a good thing to know that your

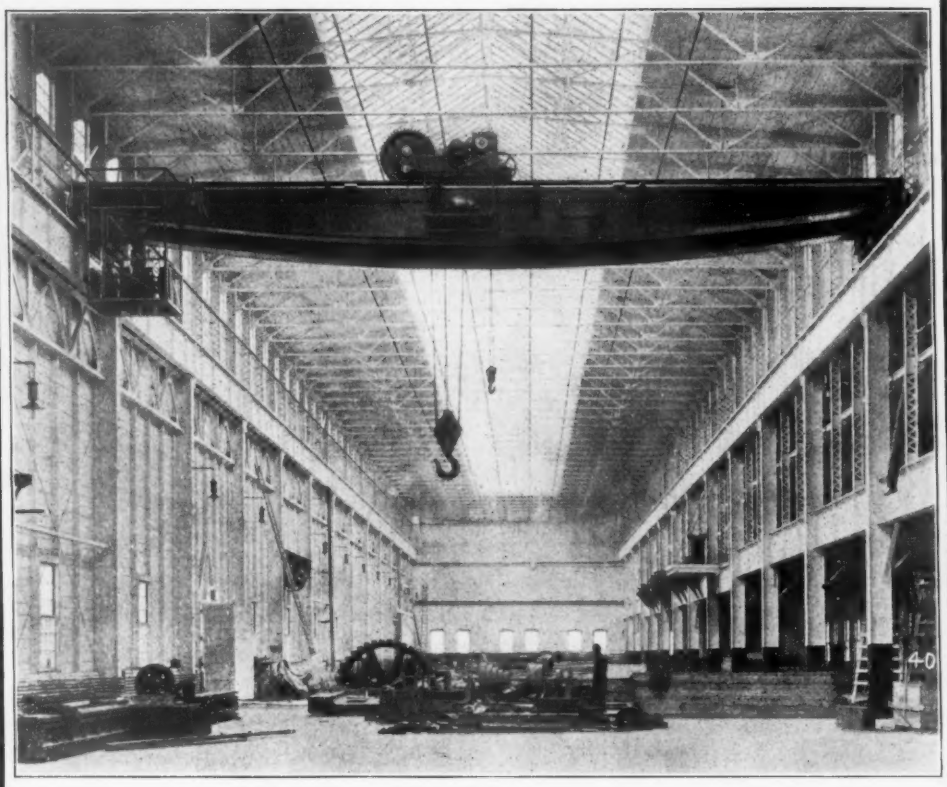
CRUCIBLES

are uniform, that they run full capacity, three pounds of molten metal to a number (which ordinary crucibles do not), and that they give satisfaction. Such are the crucibles made by the

McCullough-Dalzell Crucible Co.

Pittsburgh, Pa., U. S. A.

Write for any information you may require on the subject of CRUCIBLES.



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Main hoist 30 tons capacity, Auxiliary 5 tons capacity, span 60 ft.

Cranes for all Purposes

Electric, Air and Hand,
All Styles.

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Vertical and Horizontal Types.

ELEVATORS FOR FOUNDRIES

Operated by Electric, Compressed
Air or Belt Power.

THE WHITING CUPOLA

Well constructed, good results,
750 in service. The best
on the market.

ENGINEERS AND DESIGNERS OF COMPLETE FOUNDRY PLANTS.

Catalogues 18, 20, 21 Free on Application.

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Buffalo Down Draft Forges

Originated and Exclusively Controlled by this Company

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Buffalo Blowers

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Buffalo Steel Pressure Blower.

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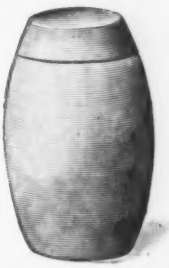

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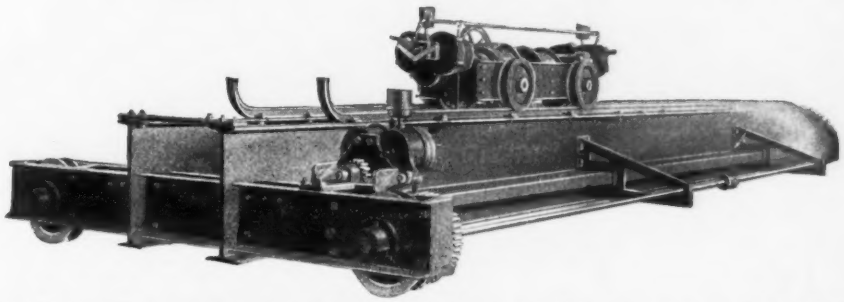

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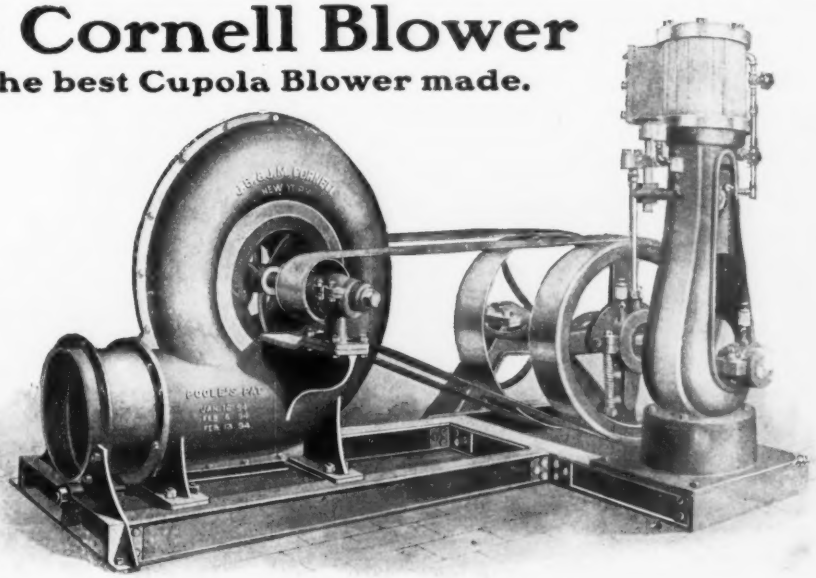

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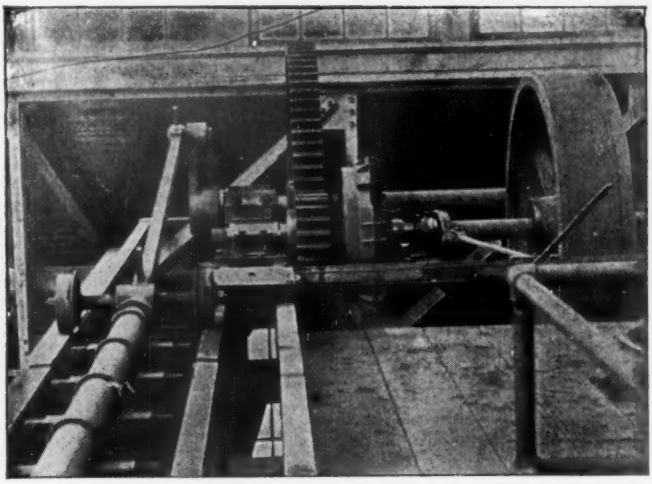

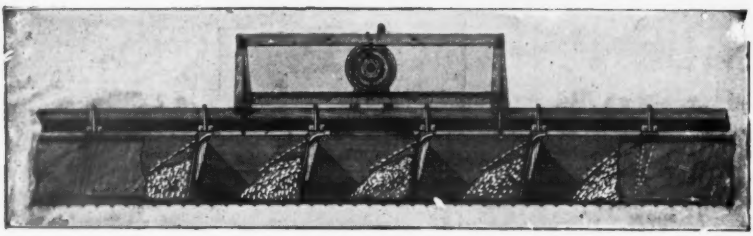

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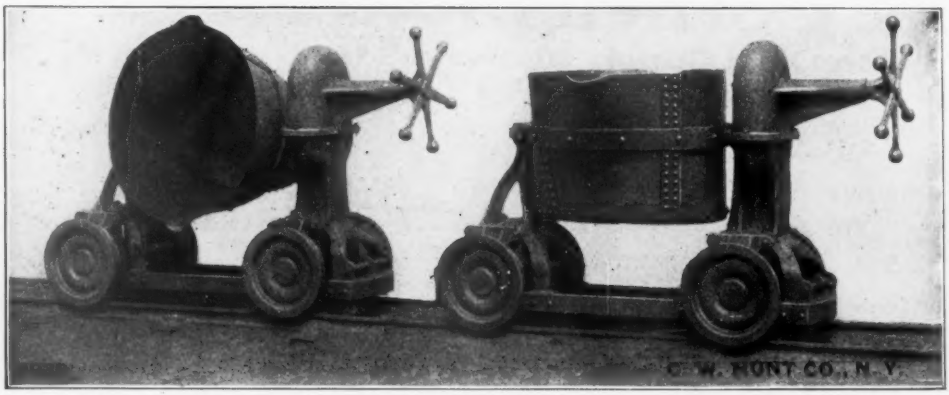

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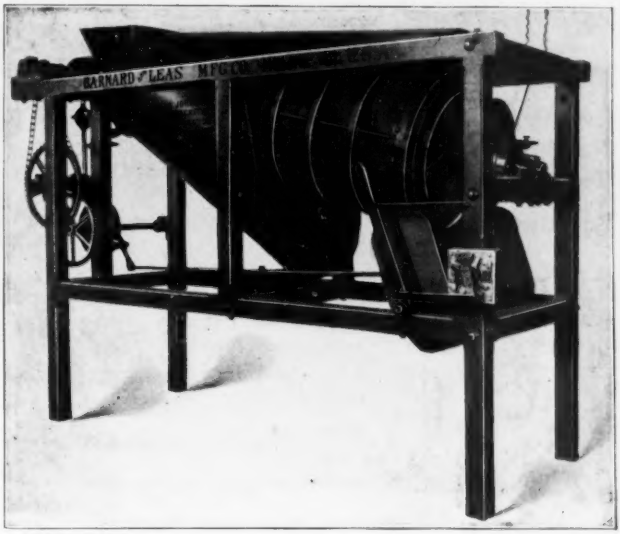

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Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months.

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Give this machine a trial. The saving will surprise you.

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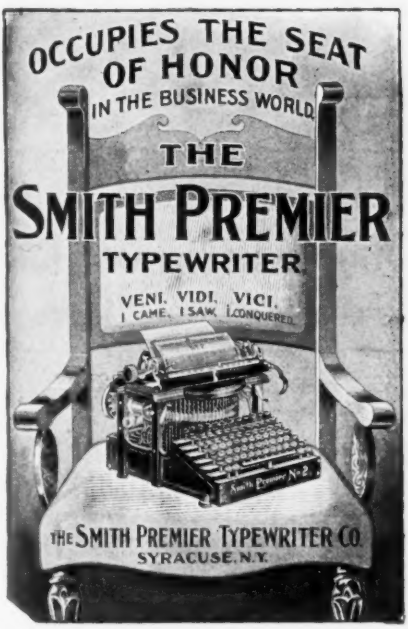

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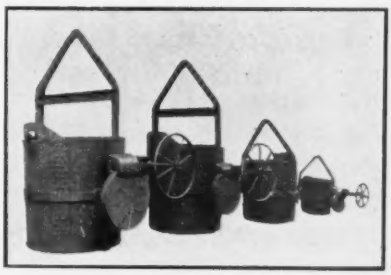

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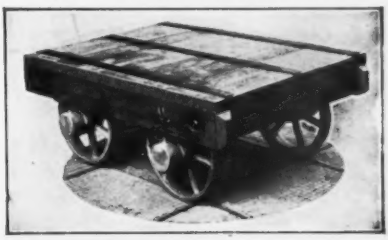

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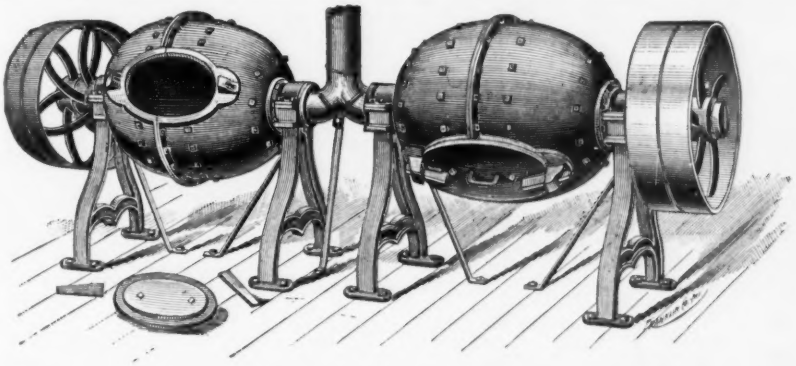

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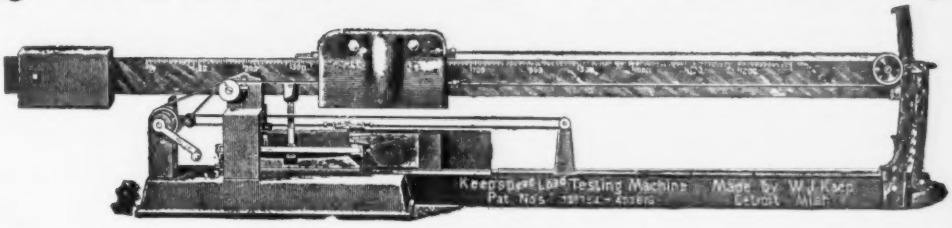

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cleaner work,
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Our product GIVES satisfaction wherever used.

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Established 1879. F. E. GORDON, Pres.

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ON ITS GOOD BEHAVIOR
If you say it's all right
YOU PAY FOR IT
otherwise we lose.

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AMERICAN GLUTROSE WORKS
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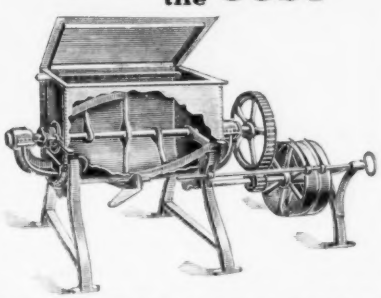
And Reduce the COST



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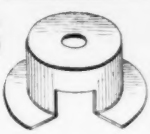
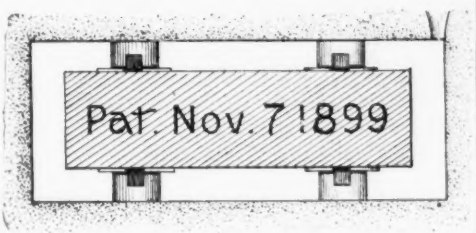
LOVEJOY'S PATENT  SHELL CHAPLET



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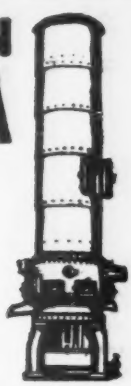

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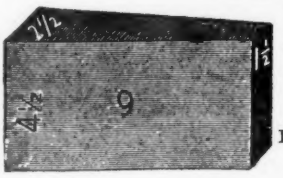

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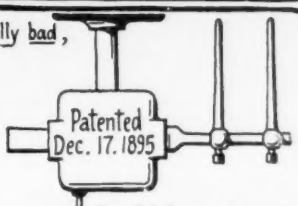

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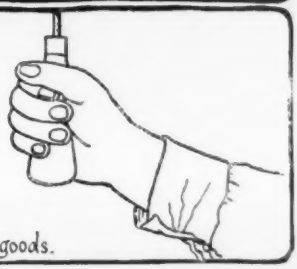

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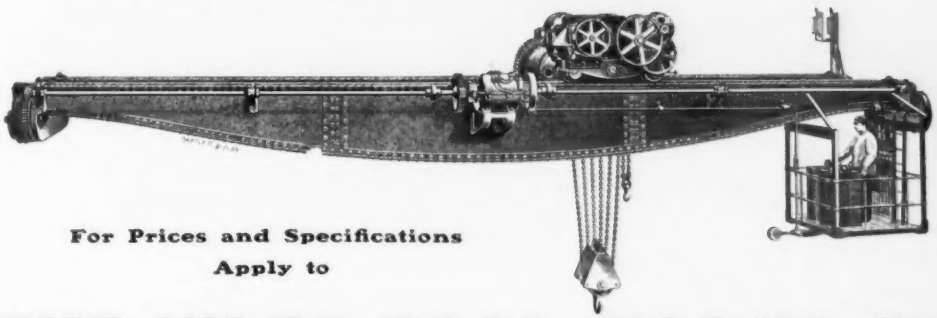

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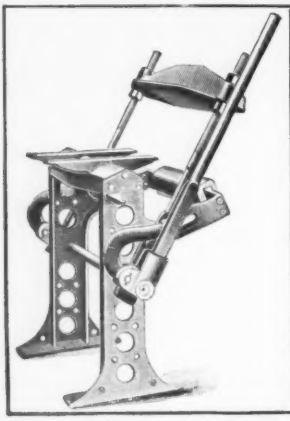

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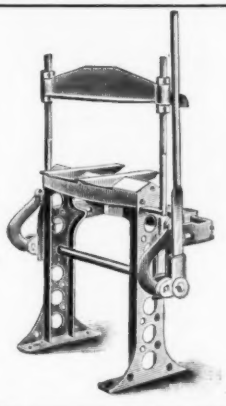

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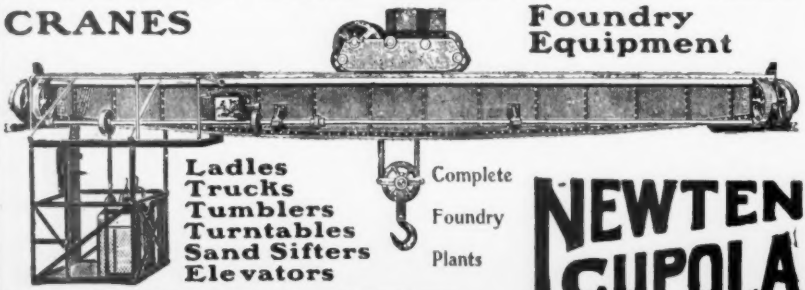

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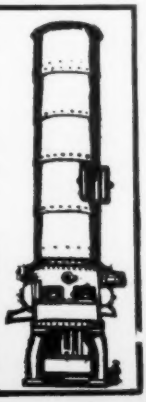

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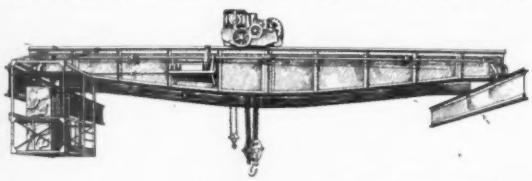

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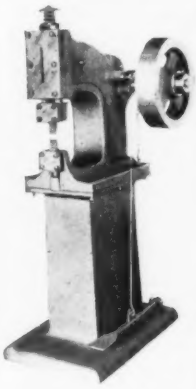

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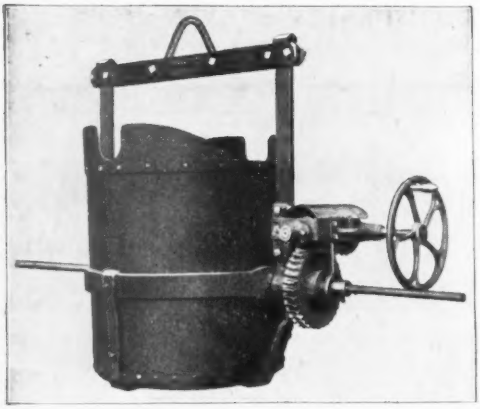

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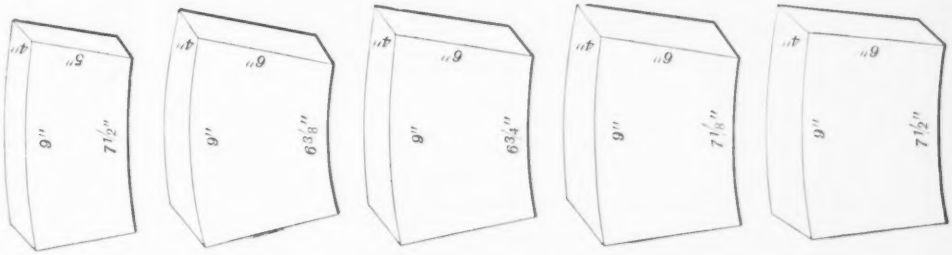

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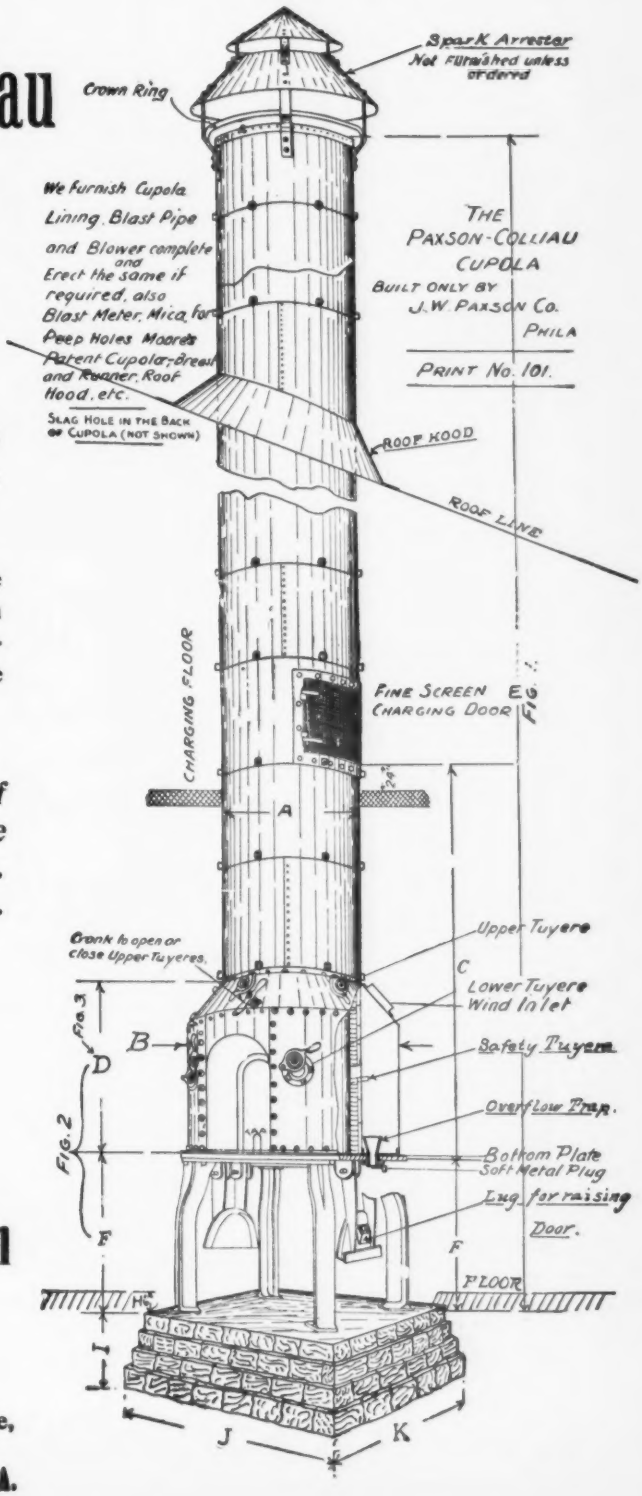

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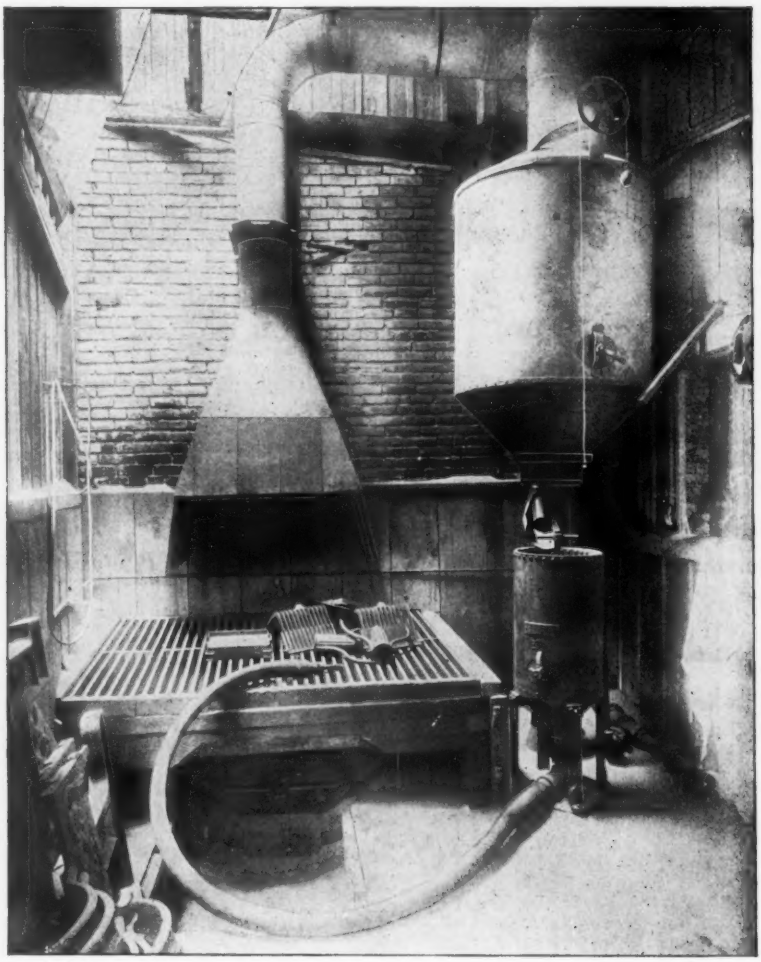

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MADE IN THREE SIZES. SEND FOR DESCRIPTIVE CIRCULAR.

APPARATUS BUILT TO MEET MODERN FOUNDRY REQUIREMENTS A DEEP AND EXPENSIVE PIT IS NOT REQUIRED.

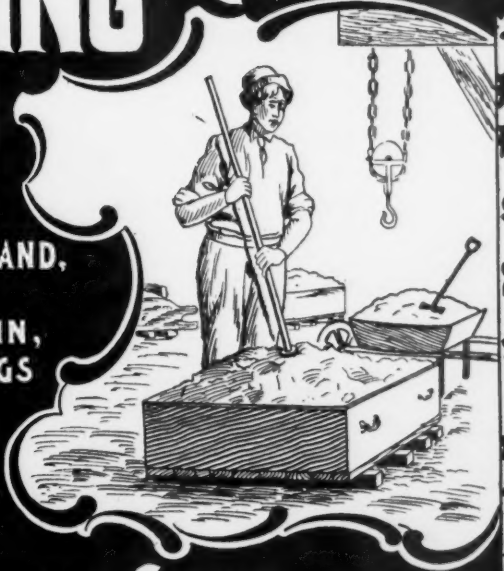
J. W. PAXSON CO. MANUFACTURERS AND SOLE AGENTS.

PHILADELPHIA, PA., U. S. A.

WHITEHEAD BROTHERS COMPANY.

MOLDING SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.



ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
NEW YORK.

PROVIDENCE OFFICE,
42 S. WATER ST.

BUFFALO OFFICE,
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
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SOUTH AMBOY, N. J.
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ATHENS, N.Y.
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Dixon's No. 6726
=GRAPHITE FACING=

NE of the many letters we receive:

"The quality of Dixon's Plumbago Facing is unsurpassed, that I can vouch for, because I used it exclusively on the large cylinders and other castings for the U. S. Battleship 'Texas.' Those castings were just like a picture; it cost a little more to use your material, but when the castings were completed they were made cheaper and better than they would have been with a cheaper material, as the difference in cost of the blacking was saved in the cleaning, as the loam fell clear from the casting, and Inspector Brooks stated that they were the finest set of castings that ever he had inspected."

A postal will bring you an interesting pamphlet.

Joseph Dixon Crucible Co.

JERSEY CITY, N. J. U. S. A.

Salesrooms at . . . 68 Reade Street, . . New York City.
1020 Arch Street, . Philadelphia, Pa.
304 Market Street, San Francisco, Cal.

London Office, . . 26 Victoria Street, . . . Westminster.

Better Facings

Can not be made

Than those turned out at the plant of the HILL & GRIFFITH COMPANY, at Cincinnati, Ohio

THE latest and best machinery gives us the greatest capacity of any facing factory in the world. The same facilities also enable us to make the very best of facings and to sell the same at a low price and make a profit.

We furnish complete foundry equipments where desired, and will be pleased to answer any inquiries you may make concerning anything relating to the foundry.

The Hill & Griffith Company,

CINCINNATI, OHIO, U. S. A.

Importers and Refiners of Graphite and Ceylon Plumbago for all purposes

Foundry Facings, Supplies and Complete Equipments

Chicago Fire Brick Co.

MANUFACTURERS

FOUNDRY FACINGS, FOUNDRY SUPPLIES,
CUPOLA BLOCKS, FIRE BRICK.

Molders' Tools.

EAST INDIA PLUMBAGO,
C. F. B. PERFECT WASH,
SILVER LEAD,
X X MINERAL, CORE WASH, ETC.

CUPOLA BLOCKS, SPECIAL SHAPES,
FIRE BRICK, FIRE CLAY.

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518 Chamber of Commerce Building,
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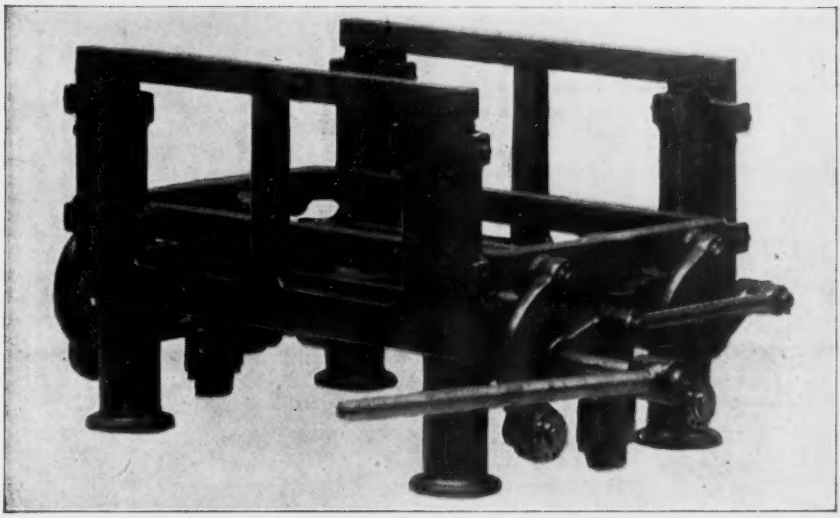
Long Distance Phone, Main 1639.

PRIDMORE
MOLDING
MACHINES

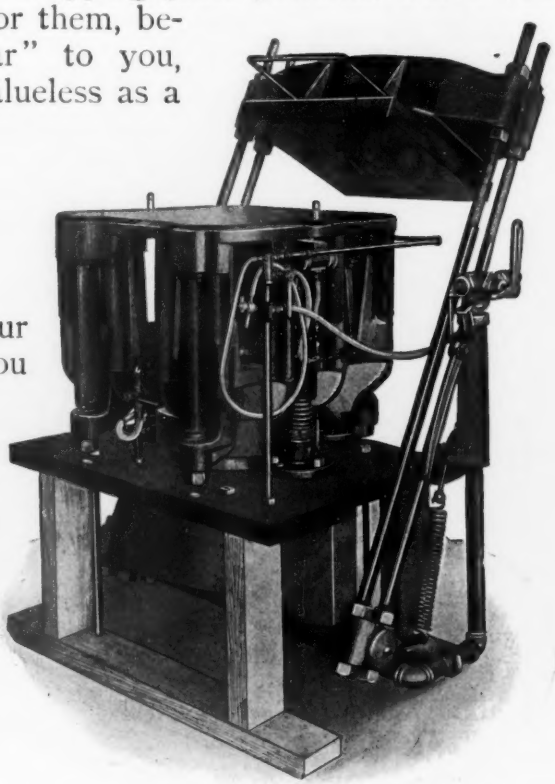


19 DIFFERENT TYPES. 250 REGULAR SIZES.
SUITABLE FOR THE PRODUCTION OF
CASTINGS OF ANY SHAPE
OR WEIGHT.

HENRY E. PRIDMORE,
CHICAGO, ILL., U. S. A.

TABOR MOLDING MACHINES

If you want Power Ramming Molding Machines—machines which do all the work except putting in the sand, setting the cores, and pouring the metal—and if you are not fond of filling catacombs full of expensive stripping plate patterns, which you keep, once you have paid for them, because they were so "dear" to you, though they may be as valueless as a departed mother-in-law,



BUY TABOR MACHINES

If you just want to use your wooden patterns quickly, you can stick them on our Paraffined Wooden Plates, and draw them with our Vibrator, if you

BUY THE TABOR

If you have a lot of gated patterns, which hand-rapping is continually knocking to pieces, you can save pattern repairs and get to machine molding of the highest class, by using our Vibrator Frame system, so

BUY A TABOR

Write us for the latest truths about Machine Molding.

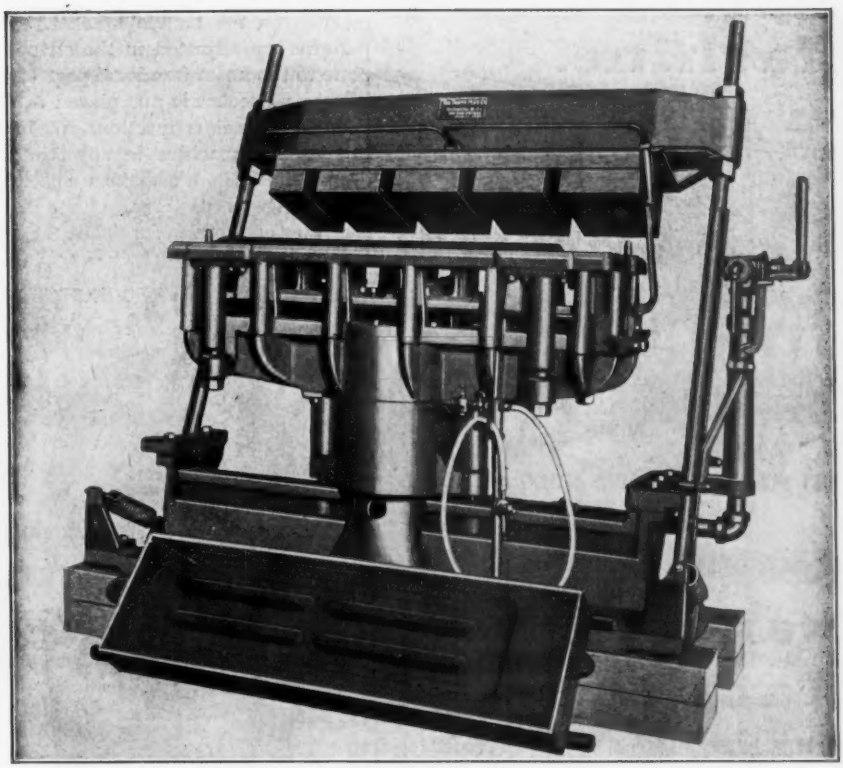
The Tabor Manufacturing Co.

18th & Hamilton Sts., Philadelphia.

JAMES HARTLEY & CO. OF MANCHESTER, LTD.,
38 Victoria Bldgs., London, England.

SCHUCHARDT & SCHUTTE,
Berlin, Vienna, Brussels, St. Petersburg

The Tabor



12½ x 41 IN. SPLIT PATTERN MACHINE.

Molding Machines

The Tabor Manufacturing Co.

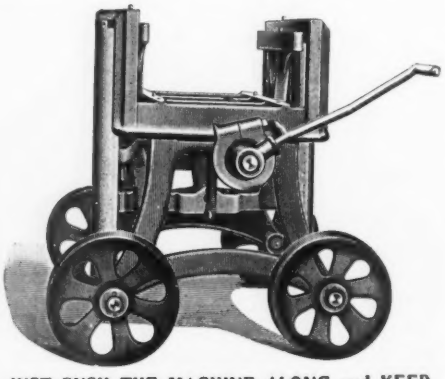
18th & Hamilton Sts., Philadelphia.

JAMES HARTLEY & CO. OF MANCHESTER, LTD.,
38 Victoria Bldgs., London, England.

SCHUCHARDT & SCHÜTTE,
Berlin, Vienna, Brussels, St. Petersburg.

Molding Machines

The
Open Frame Machine.



JUST PUSH THE MACHINE ALONG and KEEP UP WITH THE SAND PILE.

The machine is instantly set at any desired drop by the friction ring, plainly seen on the outside of the machine on the handle bracket. The patterns are adjusted in the stripping plate to the finest fractional part of an inch by an eccentric nut placed at the end of the crank connection. We build this style of machine in any size and drop required. We make a specialty of putting on patterns, either from drawings or samples furnished, at reasonable prices.

THREE SIZES CARRIED IN STOCK.

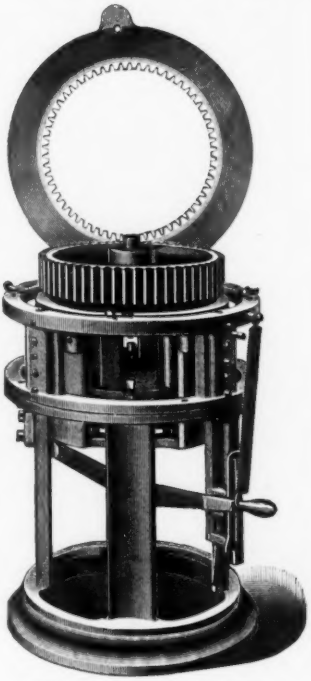
The
Standard Round Machines

Are built in any size from 12" up; the stripping frame is worked by a lever which is operated by the foot; the drop and the adjustment of the pattern in the stripping plate is easily attained by an adjusting screw seen near the lever.

This machine is designed for all kinds of work, and is particularly adapted to pulley and gear work, hand wheels, etc.

Price of 18" Round Machine 6¼" drop, $60.50 each. $110.00 per pair. Prices for other sizes furnished on application.

Write for Descriptive Circular.



STANDARD FOUNDRY CO. MACHINE

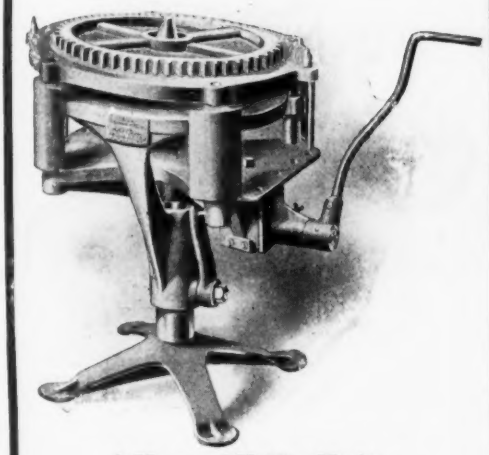
WM. H. EDDY CO.,

81 Exchange St., WORCESTER, MASS., U. S. A.

How's Your Business?

Are other founders crowding you in price or quality of castings? Do you find contracts slipping away from you which you have held for years?

If so, prepare to improve your facilities and hold your own. Machine molding will help you, as it is doing others. Increased output is the universal rule wherever **Maywood Molding Machines** are used. The quality of the castings is at the same time raised, for a Maywood machine must make castings which are true to pattern and uniform in size.



A Maywood Molding Machine.

By our system of fitting up patterns, the expensive methods adopted by other manufacturers are avoided, and the same machine will prove of equal efficiency for several jobs.

Write us what you think you need and we will promptly advise you how far we can help you.

ARE YOU PAYING MEN THREE DOLLARS A DAY TO POUND SAND? IF SO, YOU SHOULD INVESTIGATE THE . . . . . .

Maywood Pneumatic Rammer

ITS PERFORMANCE WILL SURPRISE YOU . . . . . .

MAYWOOD FOUNDRY CO.,

MAYWOOD, ILL., U.S.A.

The Farwell Molding Machines

SEND FOR CATALOGUE

Patented Dec. 21, 1897, and Nov. 22, 1898.

The above cut shows the Farwell Molding Press, 38-inch Portable, Low Table, Two Levers, with Double Tool Shelf. Other styles and sizes shown in our catalogue, which will be sent on request.

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THE ADAMS COMPANY,

Dubuque, Iowa, U. S. A.

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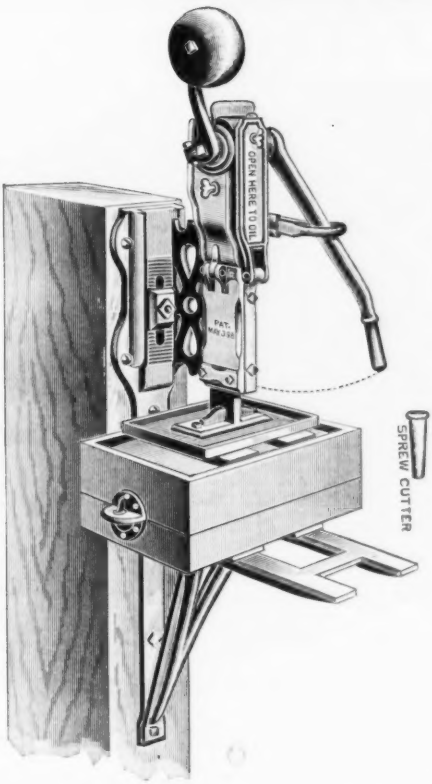
Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No **DUST** can get to **WORKING** parts.

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

J. W. JACKMAN & CO.
Sole European Representatives, London, S. W., Eng.

DON'T FORGET AYERS.

The best Molding Sand this country has ever produced is shipped by

E. M. AYERS, of Zanesville, Ohio

Every year we spend a lot of money just to have our sand carefully inspected. Whenever we find that a pit does not come up to the standard, we abandon it.

Are you buying sand from pits we abandoned long ago? Or are you getting THE REAL ZANESVILLE? If you are, you are buying it from E. M. AYERS, for no one else has it.

We have just the sand you want, and you can see us none too soon about it. It is expensive for you to use any but AYERS' ZANESVILLE MOLDING SAND. It is the only one which will suit you and we will guarantee to ship just what you order. Ask for samples and prices.

E. M. AYERS, ZANESVILLE, O.

Roots' Positive Pressure Blower

ALWAYS THE STANDARD

Established 1859.

The ROOTS obtains the minimum of friction and the maximum of efficiency Others cannot—do not

P. H. & F. M. ROOTS CO.

HOME OFFICE AND WORKS,
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PITTSBURG OFFICE, F. R. Dravo & Co., 812 Lewis Block.
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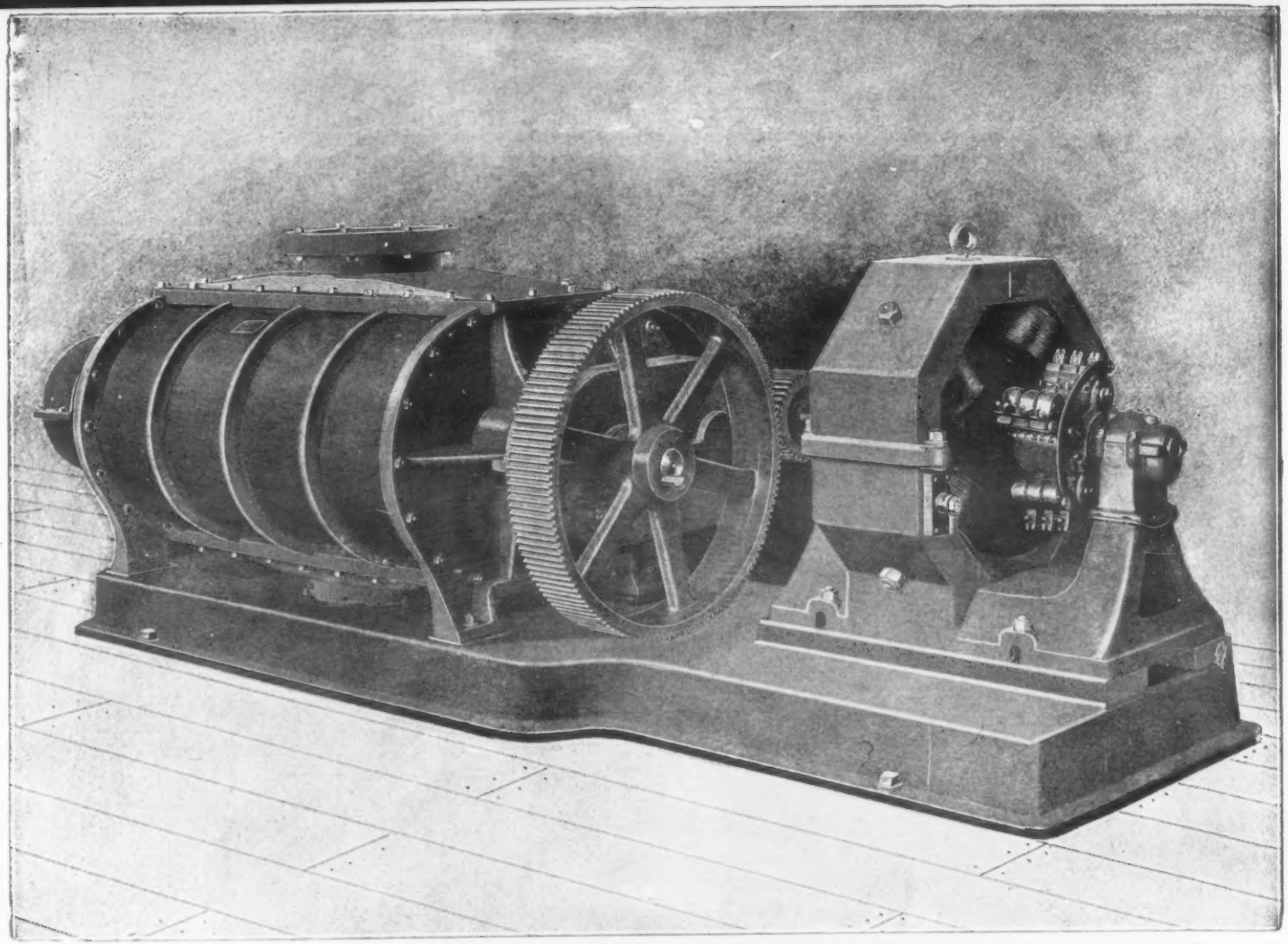

ROOTS BLOWER GEARED DIRECT TO ELECTRIC MOTOR

NEW ALBANY MOLDING SAND

Special Stove Plate

Radiator, Malleable, Agricultural Implements.

Sewing Machine Castings

And all Brass, Grey Iron, and Malleable, requiring a fine, open and strong Sand.

MASTER VAN DYE,
Our Commercial Tourist.

We Guarantee this sand Unequaled

For work named, or no charge.

The Newport Sand Bank Co., NEWPORT, KY.

CHICAGO Office: 113 Adams Street.
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ESTABLISHED
1888

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PRICES

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FOUNDRY
SAND

For Stove Plate,
Brass,
Malleable, Car Wheel,
Core, Sharp
and Extra Heavy
CASTINGS

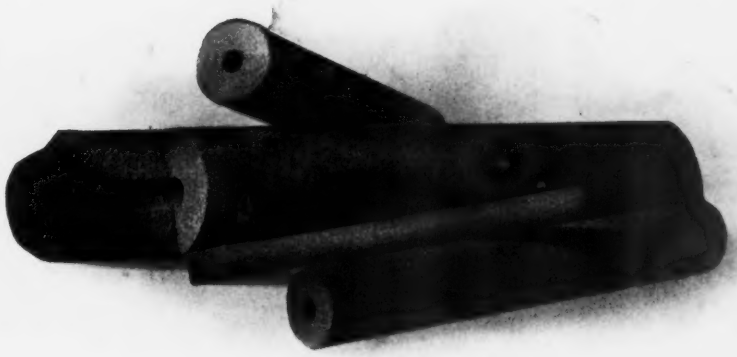
Mines
in
Missouri,
Illinois,
and
Iowa

309 EQUITABLE BLDG., ST. LOUIS, U. S. A.

The HAMMER CORE MACHINE

Makes Ten Sizes of Round Cores,
3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/8, 1 1/4, 1 3/8, 1 1/2.

7 Feet of Perfect Core cost us (for labor) ONE CENT.



How Much Do Your Cores Cost You?

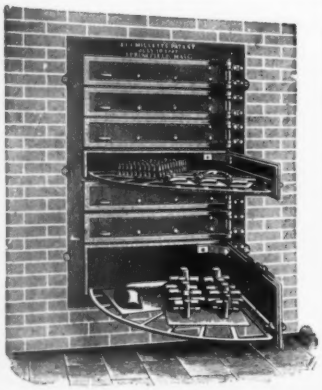
Send for Circular and Sample Core.

BROWN BROS. MFG. CO.
CHICAGO, ILL.

Branch Office,
N. W. Cor. Jackson Blvd. and Clinton St.

Office and Works,
22nd St. and Campbell Ave.

You Have Heard of the Watts-Campbell Co. of Newark, N. J.



More than likely you have seen some of the splendid engines this concern turns out.

Referring to the **MILLETT CORE OVEN** they say:

THE MILLETT CORE OVEN CO., Brightwood, Mass.

Gentlemen: — The Millett Core Oven we are using for the past year has given us excellent results. We expect to send you an order for another one as soon as we can make the necessary changes in our foundry.

Yours respectfully,
THE WATTS-CAMPBELL CO.
Per John Young.

Of course they have big core ovens for handling their heavy molds and cores, but what we have tried to impress upon you is that no matter how good your large ovens are, you can not afford to get along without a **MILLETT CORE OVEN** for your medium and light cores. You have no business to be opening the doors of your big core oven every fifteen minutes to get a small core. You are interfering with its work, cooling it off, and receiving your big cores and molds imperfectly dried.

With a **MILLETT CORE OVEN** in your shop you can let your big oven do the work for which it was built—the drying of big work. The **MILLETT** will take care of all your complicated cores and turn them out perfect, too.

Millett Core Oven Co.,

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at { The S. Obermayer Co., Cincinnati and Chicago. and for sale by { The J. W. Paxson Co., Philadelphia.
J. W. Jackman & Co., 39 Victoria St., London, S. W., England.

Do your customers kick

on the quality of the castings you are giving them? If so, add a little *Cherry Valley* quality to your output by using some *Cherry Valley Iron* in your mixture.

There is no furnace which has a better reputation for making a uniform and reliable foundry iron than the *Cherry Valley Furnace.* Foundrymen know that, however much other brands of iron may vary, the *Cherry Valley* is today, as it was long ago, the best foundry iron that can be made.

The great care we take in selecting the ores for *Cherry Valley Iron,* together with the fact that we manufacture our own coke in order to insure us the very best of fuel, account for the popularity of this iron.

You need to carry *some good iron* in stock for special castings, and also to improve the quality of the irons you now have. Therefore give us your order now and avoid delay in shipment.

Our *Cherry Valley Furnace* makes nothing but foundry iron.

The Cherry Valley Iron Co.

Murtland Bldg.

PITTSBURG, PA.

A Blessing to Brass Founders

The majority of brass founders use more or less scrap. They have to.

In doing so it is difficult to obtain a pure brass casting. This is because iron in the form of filings, or small screws, will find its way to the melting pot, causing a great deal of trouble.

We were bothered the same way for many years. We experimented and succeeded in producing a **Metal Purifier,** which we guarantee will remove all impurities, such as iron and similar substances, from brass, when melting.

Not only will our **Metal Purifier** make the old stock as good as the new for casting purposes, but it will also preserve the life of the crucible, while other materials used as a flux tend to destroy the crucible.

Another strong point in favor of our **Metal Purifier** is that it increases the strength of cast brass fully thirty per cent.

We sell our **Metal Purifier** in kegs of 100 pounds at 7½ cents per pound. Barrels containing 500 pounds may be had at 6 cents per pound, F. O. B. Chicago.

We guarantee our **Metal Purifier** to give perfect service, every pound of it. Prominent brass founders throughout the country use it. A trial order will have prompt attention.

The up-to-date brass foundry uses our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We carry a stock of the best makes of Crucibles at the lowest prices.

We also make a specialty of supplying brass foundries with Scrap Metals of all kinds at the lowest market prices, put up in crucible shape, if so desired.

Swarts Metal Refining Co.

SMELTERS AND REFINERS

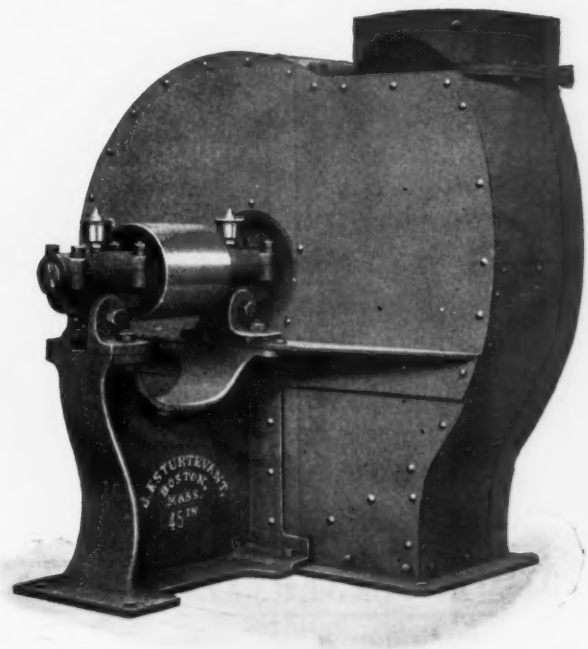
Main Office and Works, 18-20 N. Desplaines St.,

ESTABLISHED 1885.
INCORPORATED 1895.

CHICAGO, ILL.

DON'T PERMIT
A Dusty Atmosphere
in Tumbling and Grinding Rooms when a . . . . .

Sturtevant Exhauster
WILL KEEP IT CLEAR



We can furnish any size or style of Fan required and will design the arrangement to secure the best results with the least expenditure of power. :: :: :: ::

B. F. STURTEVANT CO.
BOSTON, MASS.

NEW YORK. PHILADELPHIA. CHICAGO. LONDON.

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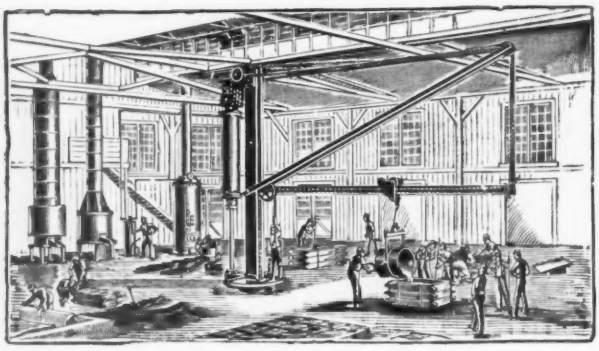


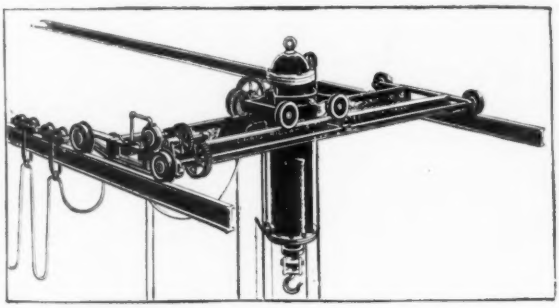
5-ton Steam Hydraulic Crane in a Foundry.

Everybody But You

knows about the wonderful Ridgway Steam Hydraulic Cranes and Elevators, and so you are the fellow we are talking to.

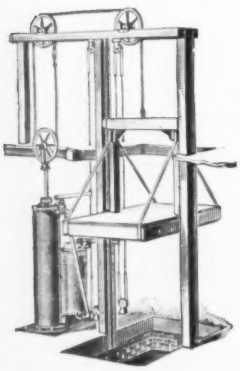
Why, if you just realized what a money maker this crane is you would not be without one any longer than you could get it. In your foundry, for example, the same molders for the same wages would do ever so much more work if they had Ridgway Cranes with that "indescribable cope lifting, pattern drawing motion."

This is why the best foundries all over the land are getting them to supplement electric travelers. The travelers to "hoss" stuff up and down the shop, and Ridgway Cranes to help the molders get up lots of work and have it good when cast.

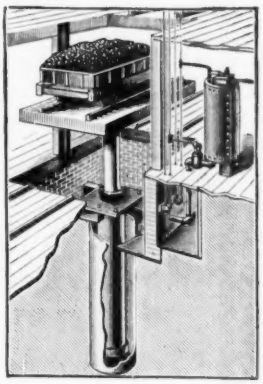


We want you to be fully informed about Ridgway Cranes and Elevators so when the occasion arises you will know just what to get. It is no longer a question of selling these machines—only one of letting the proper man about the plant know about them and that such machines are to be had.

OIL GOVERNED AIR HOISTS.



These are the only perfectly satisfactory hoists and we solicit only the trade of those who want something good. We have made these up to 50 tons capacity and for all kinds of special constructions. We will be glad to name prices and give full particulars any time.



"PLEASE TAKE THE ELEVATOR"
Hook 'er to the Biler.

CRAIG RIDGWAY & SON CO., Coatesville, Pa.

European Agent, CHAS. G. ECKSTEIN, 16 Spandauerstr., BERLIN, GERMANY.

William Sellers & Co. Incorp.

PHILADELPHIA, PA.

MODERN FOUNDRY MACHINERY

SAND MIXER

Not an Experiment

PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand**, we have issued a small pamphlet which will be sent on application.

TRAVELING CRANES FOR FOUNDRY USE.

Correspondence is Solicited.

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ENGINEERS, MANUFACTURERS and CONTRACTORS
FOR BUILDINGS, ROOFS, BRIDGES and ALL CLASSES of
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ALWAYS READY!

800 TO 4,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED, AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to all Railroads and Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y and Treas.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G CO.,

EDWARD ROBINSON, Sole Proprietor.

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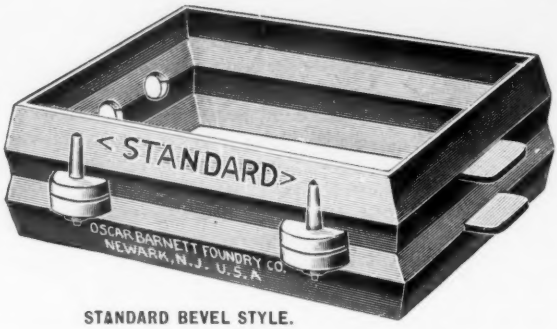

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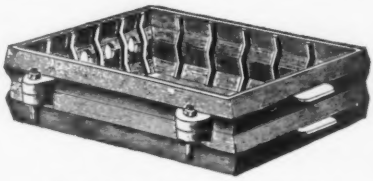

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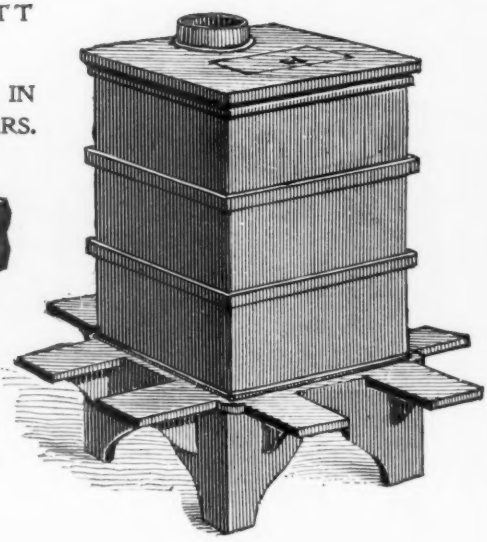

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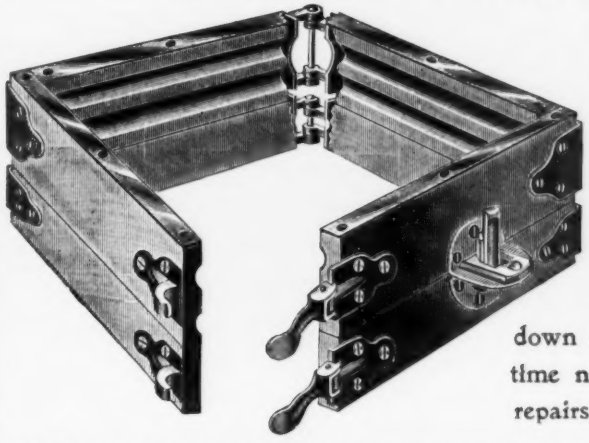
FOUNDED 1845. NEWARK, N. J., U. S. A.

NOW

we make brass molders' flasks like this. They are light and strong, the latest and best, and we guarantee them perfect.

Then. In 1845 we made flasks like these. A molder will turn out more work with our IMPROVED RIB FLASK than any other.



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We have the BEST WOOD FLASKS that are made.

All are fitted up so that all the molder has to do is to get down and dig. None of his time need be wasted in making repairs.

GET THE BEST. Order the Brass Molders' flask that is on top and you will have it. The best is the cheapest. Try it. WE MAKE ALL KINDS.

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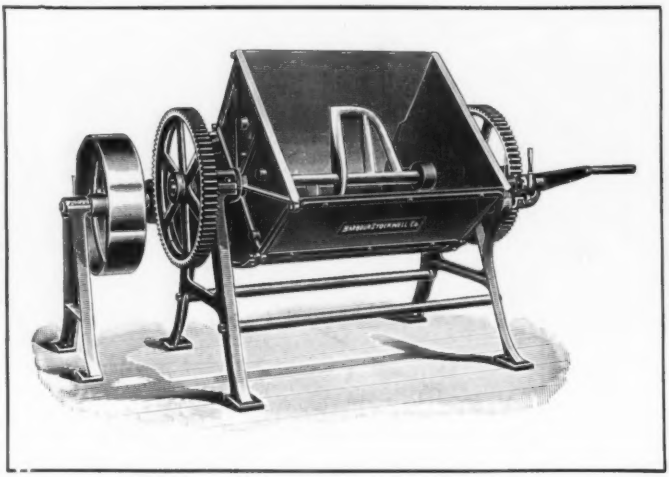

DRIVEN BY BELT OR BY MOTOR.

By its use you have a better mixed core-sand and facing at one-half the cost of that mixed by the old methods.

This Mixer is in use in many of the largest Foundries in the United States.

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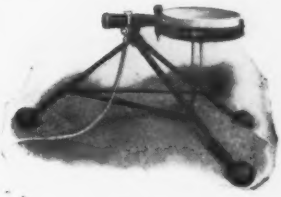
205 Broadway, CAMBRIDGEPORT, MASS.

The Hanna Portable Pneumatic Screen Shaker.

Notice what this Foundryman says of the STEAM-DRIVEN SCREEN SHAKER:



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THE WILLIAM FERGUSON FOUNDRY CO.

HIGH GRADE CASTINGS, LIGHT & HEAVY

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Chicago, March 23,1901.

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Chicago, Ill.

Dear Sir:-

The two Screen Shakers furnish by you have now been running for over 30 days and we find them doing everything you claim for them.

One man makes all the facing for 20 molders with one machine and the other machine has dispensed with the labor of one man in the Core Room. They require no attention other than the usual oiling required by any machine. The machines pay for themselves in the saving of labor in a very short time.

But the other advantages, by the use of your machines, are even much greater than the direct saving of labor. The sand is in much better condition than it could possibly be by hand shaking, and the use of your machine to a certain extent contributes to uphold and have more system in the foundry. All foundrymen know how difficult and desirable that is.

Yours truly,

THE WILLIAM FERGUSON FOUNDRY CO.
William Ferguson PRES'T.

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Overhead Tramrail Systems

ESPECIALLY ADAPTED FOR FOUNDRIES.

Our New Catalogue, fully illustrated, will be mailed to you upon request.

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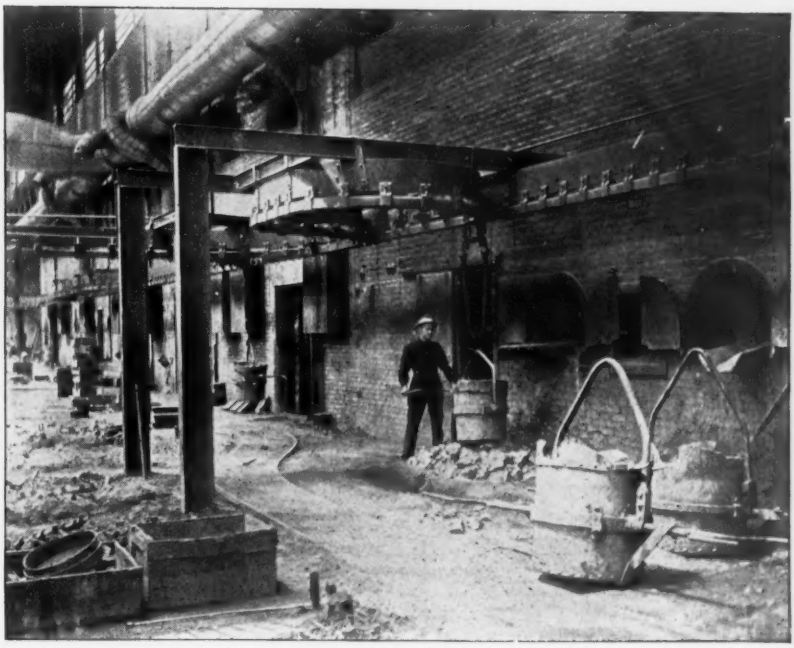

With a Coburn Trolley Track

A great part of the hardest work in your foundry becomes a pleasure to perform.

Look at the way a gang of laborers stumble along whenever anything has to be moved in or out of your shop. Think of what it costs you to have these men dragging stuff from morning until night.

By just hanging up a ***Coburn Trolley Track*** you can easily dispense with half of the laborers you now have, and the other half will move things along faster and give the molders better service than ever.

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BY USING A MAGNETIC SEPARATOR?
LET'S FIGURE:

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To first cost of Separator . . $300 00
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" labor to load cinder into mill . . . . . .
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CR.

From 65 to 80 per cent of the iron in the cinder.

By Using
SLY'S WATER MILL

DR.

To first cost $360 00
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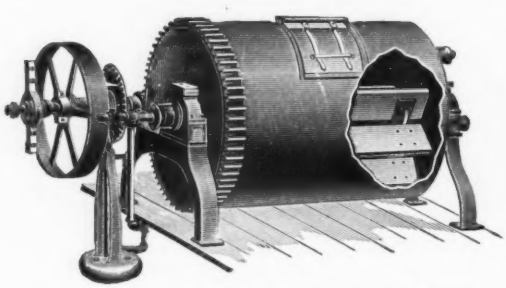
By Clean Iron saved . . 99 per cent.
" Coke saved . . . . 75 per cent.



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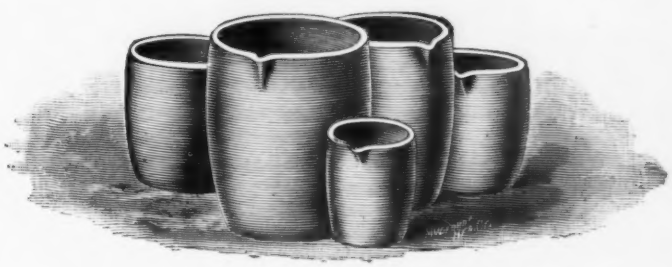

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A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

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BE ON TIME.

When you promise a customer to have a casting ready for him at a certain time, keep your word. It pays, and means more work. Promptness is a great factor in the foundry business.

Should you find that a casting has some little defect in the shape of a sand hole, a blow hole, or leaks under pressure, do not get excited about it. With a can of **Smooth-On Castings** you can fix up all of these things so that no one will know but that the casting was perfect in the first place.

Smooth-On Castings is a chemical compound which, upon application, becomes part of the casting itself. Please do not confound it with the many cheap Fillers with which the market is flooded.

We manufacture **Smooth-On Compounds** for many different purposes. A booklet describing them will be mailed you upon request.

Chemical Analysis is the only thing which will tell you whether your iron, coke or sand are up to specifications. We make a specialty of analyzing these things for foundrymen and furnishing them with chemical advice. Write for our catalogue, which shows the cost of the different analyses.

Before Using SMOOTH-ON Castings.

After Using SMOOTH-ON Castings.

The Smooth-On Mfg. Co.,

VREELAND TOMPKINS, Chemist and Manager,

ANALYTICAL AND MANUFACTURING CHEMISTS,

Jersey City, New Jersey.

It's a good thing
to know that your

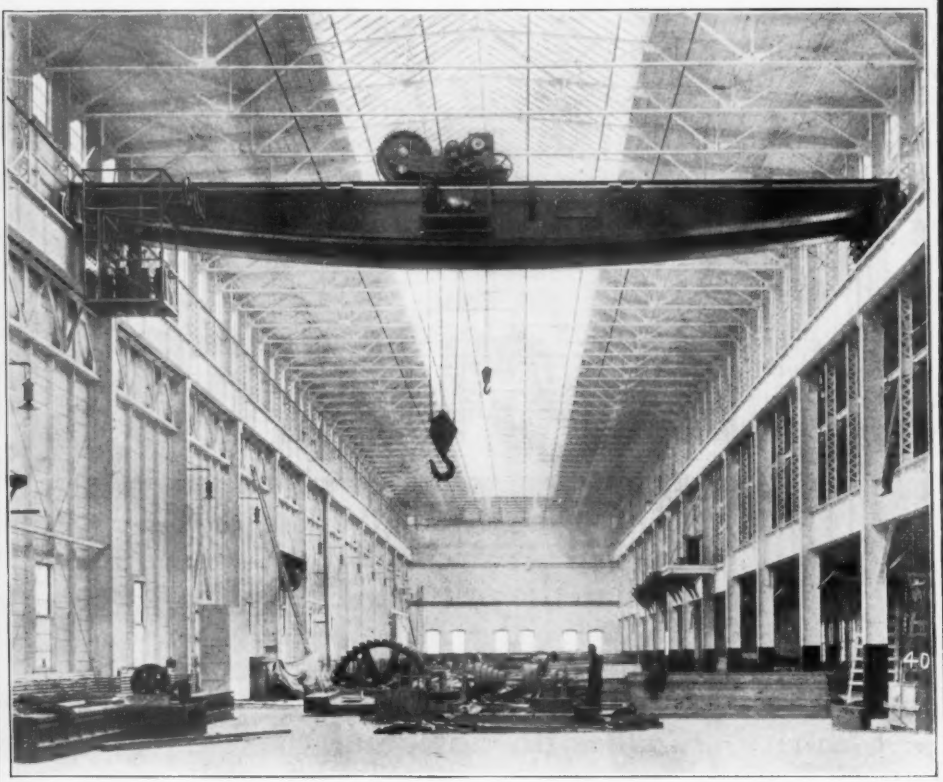
CRUCIBLES

are uniform, that they run full capacity, three pounds of molten metal to a number (which ordinary crucibles do not), and that they give satisfaction. Such are the crucibles made by the

McCullough-Dalzell Crucible Co.

Pittsburgh, Pa., U. S. A.

Write for any information
you may require on the
subject of CRUCIBLES.



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Main hoist 30 tons capacity, Auxiliary 5 tons capacity, span 60 ft.

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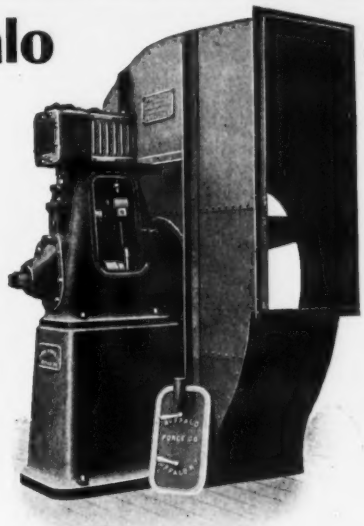
The economy factor of modern boiler practice



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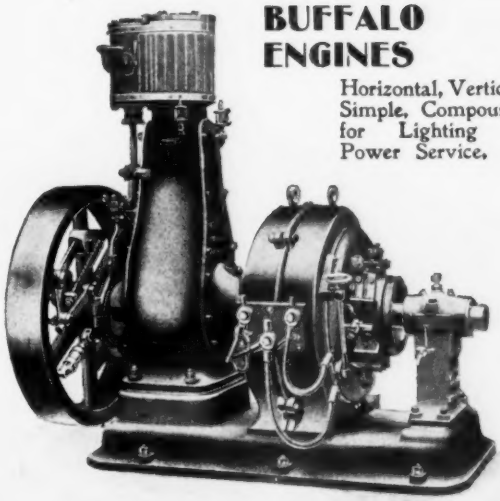

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HIGH-SPEED ENGINES FANS BLOWERS DOWN-DRAFT FORGES

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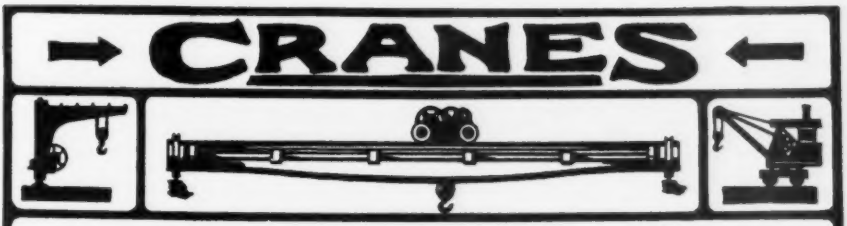

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keeps posted on the trend of the markets. He knows when the bottom is reached and lays in a stock. The man who knows when to buy has the best chance of success in any manufacturing enterprise.

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is *the* journal which will post you on the iron markets every week. Its information is collected with the utmost care. It is information which you can not afford to be without.

Three dollars pays for a year's subscription. Ask for a sample copy.

The Iron Trade Review,

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Undisplayed Advertisements.

Rate thirty cents per line each insertion. Answers addressed to our care will be forwarded.

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WANTED—Experienced foundryman with small capital to take charge of paying business. Address "LOUISIANA," Box 542, care THE FOUNDRY, Cleveland, Ohio.

WANTED—Position as foundry foreman. Can handle loam, dry and green sand work. Address "FOREMAN," Box 550, care THE FOUNDRY, Cleveland, Ohio.

WANTED—A good second-hand jib crane to carry from seven to ten tons. Give particulars and also state best cash price. HOFFMAN HINGE & FOUNDRY CO., Cleveland, O.

WANTED—Molder foreman for a malleable iron works; only those well up on railroad castings need apply. Address "MALLEABLE," Box 547, care THE FOUNDRY, Cleveland, Ohio.

WANTED—An experienced man to install and operate plant to manufacture cast iron enamel ware. Address, stating experience, "ENAMEL," Box 545, care THE FOUNDRY, Cleveland, Ohio.

WANTED—Competent foundry foreman. None other need apply. Must have A1 references. Good place for right man. Address "ILLINOIS," Box 534, care THE FOUNDRY, Cleveland, Ohio.

A THOROUGHLY PRACTICAL foreman pattern maker on marine, steam engine, machine or special work is open for engagement. Address "PATTERN MAKER," Box 546, care THE FOUNDRY, Cleveland, Ohio.

WANTED—Melter for air furnace malleable work for comparatively small castings, preferably a man capable of superintending the construction of a furnace. Address at once ARTHUR E. BARLOW, Newark, N. J.

WANTED—Position as foreman in a foundry making small gray iron castings by an experienced man up to date in modern cupola practice, also molding machines. Address "SMALL CASTINGS," Box 543, care THE FOUNDRY, Cleveland, Ohio.

WANTED—Foundry foreman, only one having experience, thoroughly reliable and steady need apply; must furnish references, line of work, light iron castings; employ 35 to 40 molders. Address "SOUTHERN," Box 551, care THE FOUNDRY, Cleveland, Ohio.

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Roots second hand, bought, sold or exchanged. All my blowers are overhauled by expert blower machinists. I do not advertise a "fake" list of blowers not in my possession; my stock is constantly changing. Write for particulars and prices.

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FOUNDRY BUSINESS FOR SALE—Owing to poor health and old age, I wish to dispose of my business. The town is a live one of over 8,000 and this the only foundry. Small capital required. Address J. MAYNE, Oneonta, N. Y.

FOR SALE—Second-hand.
1 No. 6 Root Blower; used 7 months.
2 No. 9 Sturtevant Pressure Fans; good order.
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500 second-hand machine shop tools; send for list.
JOHN H. DAWSON, 39-41 S. Canal St., CHICAGO, Ill.

FOR SALE—One of the best located foundry and machine shops in the state of Oregon. Now doing a fine business and with great prospects as the country develops. Right in the heart of the mining and lumber territory, the natural resources of which are the greatest on earth. No competition on either side for hundreds of miles. Best of reasons for selling. Address "OREGON," Box 548, care THE FOUNDRY, Cleveland, O.

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MALLEABLE IRON SUPERINTENDENT.

To take charge of our plant. Must be experienced. Good position for right man. Give references, experience and age. Address

South Bend Malleable Iron Co.,
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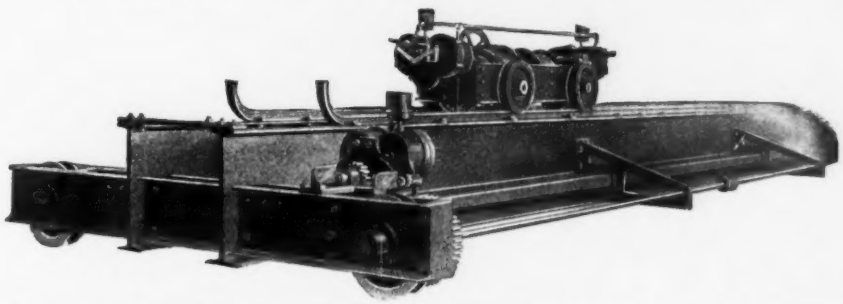
Traveling Cranes and Chain Hoists

STATIONARY PNEUMATIC MOTORS



PORTABLE PNEUMATIC HOISTS

3,000 to 20,000 pounds capacity. Send for May Catalogue now in press.

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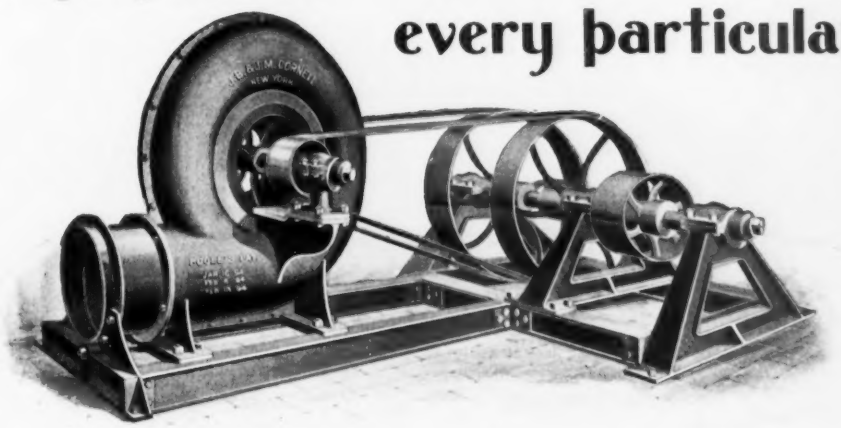
It fulfills its duties in every particular



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"DEAR SIRS: After a trial of some months I wish to say that your Poole-Patent Pressure Blower has fulfilled its duties in every particular. This is very satisfactory to me, as the blower was put in my works to replace one of another make that had caused me much trouble and annoyance."

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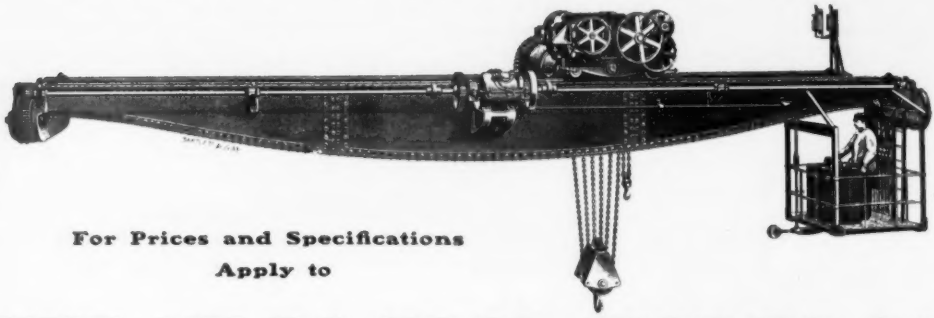

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BOSTON, 65 Oliver Street
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ST. LOUIS, 615 N. 4th Street
LONDON, 23-25 Victoria Street, S. W.

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Stockholm, AK. V. LOWENER
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Helsingfors, WERNER HULT
Rotterdam, VAN RIETSCHOTEN & HOUWENS
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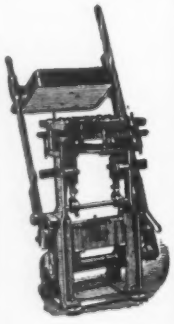

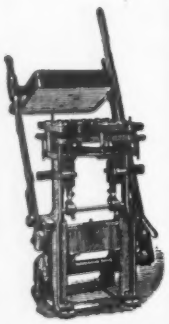

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Moulding Machines

(McCANNA PATENT)

NOT A CHEAP PRESS BUT A MOULDING MACHINE

The great objection heretofore to adopting Moulding Machines has been the cost of fitting patterns for a draw plate. The patent granted us, February 1st, 1898, covering a pattern-rapping and flask-lifting attachment, does away with the draw plate system.

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Pine Pattern Lumber.

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SOFT.
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Choice Stock.
Low Prices.
Quick Shipments.

Mail Schedule when next car is wanted. Would like to quote.

SAND BLAST MACHINERY

For removing Scale from Iron and Steel Plates, Bars, Forgings, etc., also cleaning Iron, Steel and Brass Castings

SOLE AGENTS:

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For All Foundry Requirements

Write us for Details and Prices.

THE CASE M'F'G COMPANY,
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High Speed Electric
TRAVELING CRANES

Built Promptly for Long and Hard Service. Write Us.

The North Penn Iron Co. 3rd and Sedgley, PHILADELPHIA, PA.

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Pig Iron and Foundry Supplies Analyzed.

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A good book on Foundry Practice, Melting or Molding, we can supply you.

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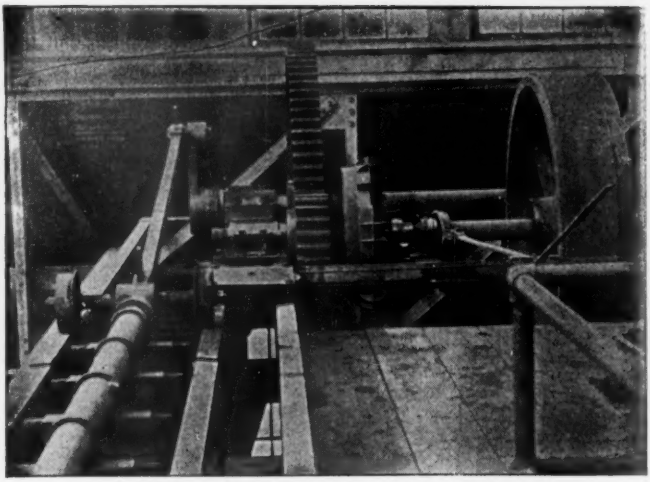
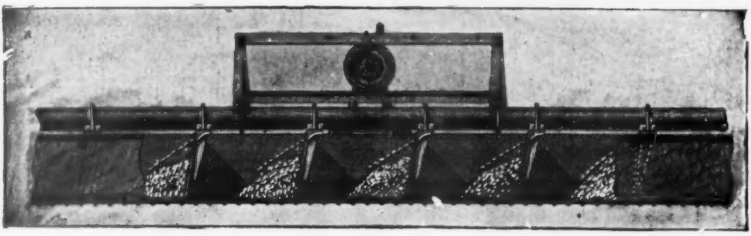
FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.

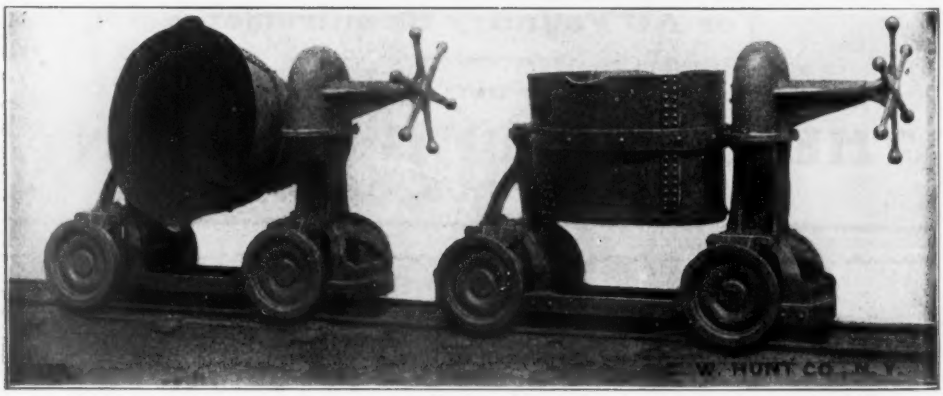




Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, Wilmerding, Pa.

PATENTS PENDING.

Complete Installations.



Ladle Cars, 1,500, 2,000, 3,000 Pounds Capacity.

Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 36 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

Our system of narrow-gage tracks, switches, curves, turntables, etc., for use in manufacturing establishments and to accommodate such special cars as the above, is worthy of careful investigation by those who are apt to be interested.

We shall be pleased to furnish full particulars upon application. Address the works direct.

C. W. Hunt Company, Brad Street, WEST NEW BRIGHTON, NEW YORK CITY

Save Your Iron

Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months.

DEERE & MANSUR CO.,
Corn Planters, Disc Harrows, Corn Shellers and Huskers.

Moline, Ill., April 5, 1901.

BARNARD & LEAS MFG. CO.,
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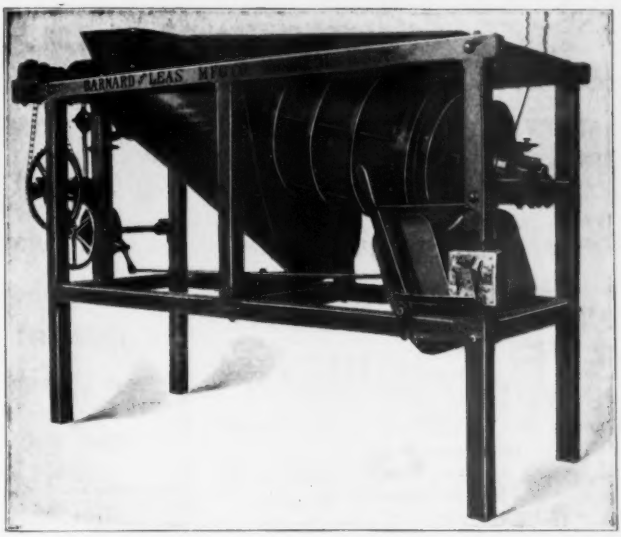
Gentlemen:—We have been using your Magnetic Separator for four months past, and have been saving an average of 800 lbs. of iron daily from our waste that previously had proved a total loss, we casting from 18 to 25 tons daily. We can freely say that for economy and ease of operation and the saving of practically all iron in foundry waste, we have never used or seen the equal of it, and from our experience freely recommend it in the strongest terms.

DEERE & MANSUR COMPANY, Jas. Barclay, Supt.



Automatic Magnetic Separator.

Give this machine a trial. The saving will surprise you.

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WE equip foundries making small or duplicate work with labor saving machinery for handling sand, flasks, molds and castings.

Such appliances are now necessary to economical production.

ENGINEERING COUNSEL, DESIGNS and ESTIMATES are free to intending purchasers.

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Agencies,
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In bond or duty paid.

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Also Publisher Base Ball Calendar (six months) Thirty Cents. Send your name and address and get free a circular describing Calendar, together with picture of a Sequoia Gigantea and a Fresh Snowball, the kind that does not melt. Calendar is in bright colors, especially designed for framing.

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Soften, Fluidize, and Correct Shrinkage in your mixture. Experienced Melter.

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YOUR IRON CONTRACTS

In making your contracts for 1901 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

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These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

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"FAIR DEALING" Their Motto.

MANUFACTURERS OF

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INSPECTED FOUNDRY IRONS . . . .

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NEW YORK OFFICE, No. 71 Broadway.

Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture?

DEAL WITH THE MANUFACTURER DIRECT.

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PIG IRON.

Manufactured by

THE COLUMBUS IRON & STEEL CO.

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Manufacturers of Bessemer, Basic, Malleable and Foundry Irons.

Your correspondence is invited.
Sold direct by the manufacturers.

NO SMOKE, SMELL OR GAS

will you have in your shop when you use JELOLUSE CORE COMPOUND in making your cores.

The blowing of cores is caused by the gas producing stuff put in the core sand. JELOLUSE contains the minimum of gas-producing materials. Therefore the chances of having a core blow are reduced when you use JELOLUSE.

If you want castings that are easily cleaned and perfect, you must use JELOLUSE.

Full particulars about it if you will write us.

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OTIS STEEL

"OTIS" FIRE BOX PLATES A SPECIALTY.
Flange Plates, Ship Plates, Tank Plates, Steel Car Axles, and Forgings of all kinds.

Steel Castings from 100 to 75,000 lbs.

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For Blast Furnaces and Foundries; also Crushed Connellsville Coke substitute for Anthracite Coal for manufacturing and domestic purposes.
13,500 ovens. Daily capacity 30,000 tons of Coke.

Mines and Ovens in the Connellsville Coke Region, Penna.

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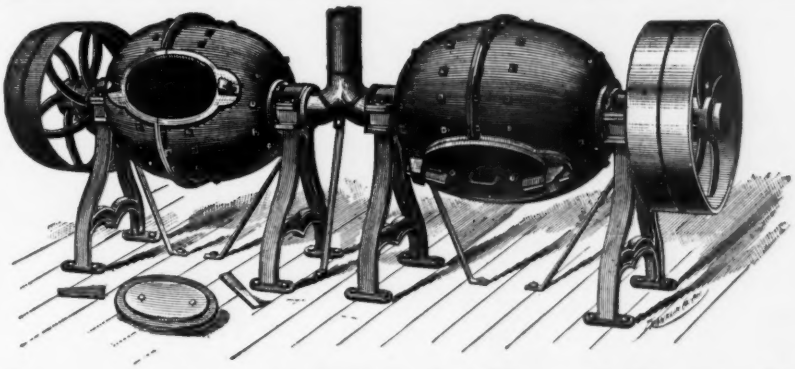
Quotations, Freight Rates, Pamphlets giving full information, promptly furnished upon application.



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Stover's Improved Exhaust Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other, with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days' approval to any responsible manufacturer of light castings, malleable iron, wire nails, or any other small articles that require cleaning and polishing.

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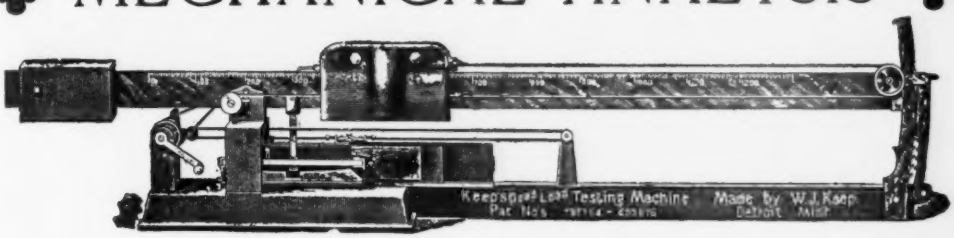

The Only Practical Method for

MAKING CASTINGS of a desired quality

AT A LOW PRICE.

Send for Testimonials and for Description of

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W. J. KEEP, Detroit, Mich.

One Carborundum Wheel's Record.

The burden of our advertisements for years has been:

"Carborundum does more work,
faster work,
cleaner work,
than any other known abrasive."—

And here's proof, on at least the first two points:—

> "We have been using a 24 by 1¼ inch Carborundum wheel nine hours every day since July 14, 1900, in grinding rough castings. We work up about 8 tons a day. The wheel has not been dressed since we began to use it, and at this date, January 7, 1901, after grinding 1200 tons of castings, is still in excellent shape and has worn down only ten inches in diameter in the six months' service."

That is what a well known Foundry Company has to say about it. We are getting letters of that sort every day, from all sorts of people. Is it any wonder we have faith in Carborundum?

> Let us send you the booklet telling all about the most economical grinding wheels on earth.

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ESTABLISHED 1875.

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INVENTORS OF THE

FLEXIBLE SHAFT

FOR ALL PURPOSES.

The oldest and largest manufacturers in the world.

PORTABLE EMERY GRINDER.

Take the tool to the work and save heavy handling.

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GLUTROSE CORE COMPOUND

"ON PAROLE"

Put a 5 gallon sample can of

GLUTROSE CORE COMPOUND

in your core room

ON ITS GOOD BEHAVIOR

If you say it's all right

YOU PAY FOR IT

otherwise we lose.

When you consider the possible number of foundries that may accept this offer, you will realize that we could not afford to make it unless we had, from experience, knowledge of the value of

GLUTROSE
CORE COMPOUND

AMERICAN GLUTROSE WORKS

PHILADELPHIA, PA.

IF YOU WANT TO BE UP-TO-DATE GET AN UP-TO-DATE CUPOLA

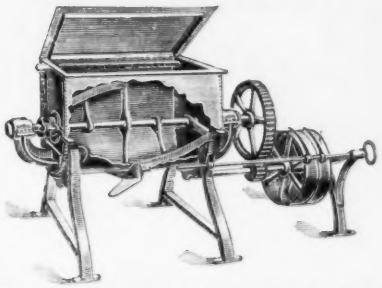
"THE NEWTEN"

IT MELTS FASTER, BETTER, CHEAPER.

THE MODERN MELTER

Northern Engineering Works, No. 4 Chene St., DETROIT, MICH.

Mix Your Core Sand Better
And Reduce the COST



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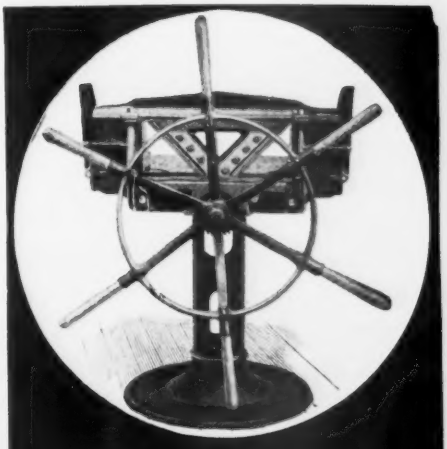
Makes and Saves Money for Foundrymen.

Is a strong, well-made machine and does the work more perfectly than any other. Provided with sprinkler for tempering the sand as needed, and stands sufficiently high to admit a wheelbarrow below to receive sand.

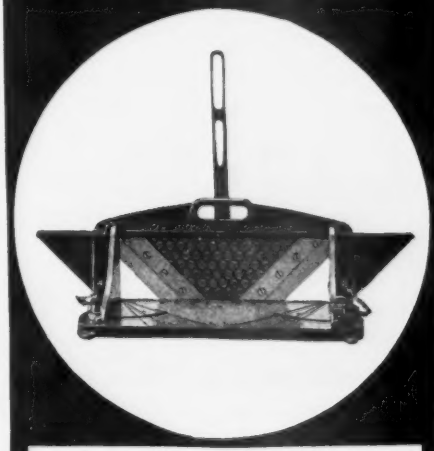
A HIGH-CLASS MACHINE WHICH WILL SOON PAY FOR ITSELF

THE J. H. DAY CO.

1144 Harrison Avenue, CINCINNATI, O.



OLIVER WOOD TRIMMERS CUT DOWN COST OF PATTERN WORK



A large Oliver Wood Trimmer is a necessity in every pattern shop where high class work at the lowest cost of production is desired. But where more than one pattern maker is employed, bench trimmers will also earn an enormous rate of interest on the investment. Think of the convenience of having a machine right within reach instead of across the shop on the other man's bench. You wouldn't ask a workman to share his planes or chisels with his neighbor—why do it with a trimmer? An Oliver Wood Trimmer on each man's bench will be kept sharp and used more often than any other tool he uses. Don't forget a large one for large work though.

Write for description of our complete line.

AMERICAN MACHINERY CO.
GRAND RAPIDS, MICH.

An Ancient Custom

It is according to an ancient custom that the molder makes an unsightly button on a casting wherever a chaplet must be used.

In times gone by this was considered necessary in order that the metal might secure a better hold upon the chaplet and leakage thus be avoided.

With the perfect chaplets made by the Fanner Manufacturing Co., there is no need of resorting to any subterfuge to obtain a perfect joint between metal and chaplet. Fanner Chaplets secure a perfect union.

We make special chaplets of all kinds, besides the regular lines which we carry in stock for instant shipment.

Our catalogue and price list cannot help but interest you.

...THE...

FANNER MFG. CO.

Brookside Park,

CLEVELAND, OHIO.

Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

A Good Opportunity

for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

The business has been established since 1868 and is in a paying condition.

A full chance is offered intending purchasers to investigate. Address,

FOUNDRY AND MACHINE SHOP,
Box 309, care The Foundry,
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The Gobeille Pattern Co

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We will make your patterns quickly and at low cost. We have a number of customers for whom we make more than one thousand dollars' ($1,000.00) worth of patterns each month. We have made eighteen thousand dollars' ($18,000.00) worth for one corporation inside of ninety days.

Save One Man's Wages.

If you are running a foundry of average size and output there is nothing surer than that

The Springfield SAND SIFTER

will save you the daily cost of at least one laborer.

We make two kinds of sand sifters, a power machine for use where large bodies of sand can be riddled in one location, and a hand machine, which can be placed wherever it will best serve the molder.

It will pay you to have both kinds of machines in your shop. Send for circular showing why.

The Springfield Foundry Co., SPRINGFIELD, O., U. S. A.

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Foundry, Machine Shop and Rolling Mill Equipment.

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Maryland Car Wheel Works, Car Wheels.
"Mount Savage" Fire Brick.
"Pridmore" Molding Machines, for Iron and Brass Foundries.
"Whiting" Cranes, Cupolas, Air Hoists, and other Foundry Equipment.
"Little Giant" Pneumatic Tools.
Barnard & Leas Mfg. Co., Magnetic Separators.
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ANALYTICAL CHEMISTS,

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Particular attention paid to analyzing foundry irons and supplies. Samples taken anywhere in the U. S.

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Emery-Corundum WHEELS,

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FRESH SNOWBALLS

ALWAYS ON HAND.

The Kind That Do Not Melt.

Also, Cowen, T. Carr, M. T., and other brands of English Fire Brick.
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T. Carr (English Fire Tiles).

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Established 1856.

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FIRE BRICK of All Shapes and Sizes.

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Works—Maurer, N. J.

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HIGH GRADE FIRE BRICK.

"C"-Steel,
Flint,
Beaver
} Brands.

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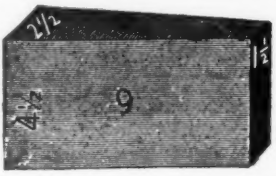
Flaked and Bolted Clay.

"Royal Star" and "Scioto Star"

High Grade FIRE BRICK.

Best for Rolling Mills, Blast Furnaces, Foundries, etc. Try our Cupola Blocks and Scioto Ground Clay.



The Scioto STAR Fire Brick Works,

PORTSMOUTH, OHIO.

Send for Catalogue.

Established 1871.

Incorporated 1876.

Cleveland and Pittsburg Sand Co., Ltd.

OFFICES: 1 BROWN ST., ALLEGHENY, PA.

"Paragon" Sand Bank, Peninsula, Ohio.

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The strongest and most open fine and medium sands in the market :: :: ::

WRITE FOR SAMPLE. PROMPT SHIPMENTS AT ALL TIMES.

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We make a specialty of Complicated Designs

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AIR COMPRESSORS

Pneumatic Chipping Hammers, Hoists, Casting Cleaners, Sand-Blast Machines, Molding Machines and other appliances in foundry work. Catalogue free.

Clayton Air-Compressor Works, 26 Cortlandt St. NEW YORK

Standard Sand & Foundry Supply Co.,

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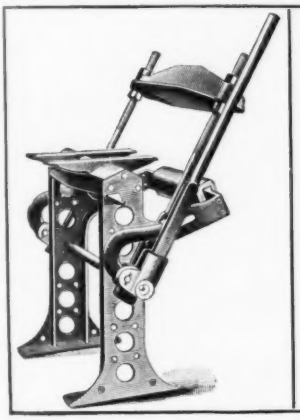
Manufacturers, Operators and Shippers of
NEW PROCESS AND ALL GRADES OF MOULDING SANDS.

Dealers in T. P. KELLY & CO.'s Foundry Facings. SCIOTO CO.'S Fire Brick. Fire Clay and General Foundry Supplies. Sand Banks at Everett, Ohio.

Stewart's Liquid Core Compound.

Cores made with Stewart's Core Compound require less rodding, less venting and will not cut. We have no use for flour in medium and light cores. Send for descriptive circular

W. H. STEWART, 105 John St., NEW YORK.



RACINE MOLDING MACHINES

We have been manufacturing molding machines for more than twenty-three years and **Racine** machines are acknowledged to be the most **simple, practical** and **easily operated** molding machines on the market to-day. They cost no more than inferior goods. :: :: :: :: :: :: :: ::

RACINE HARDWARE CO.
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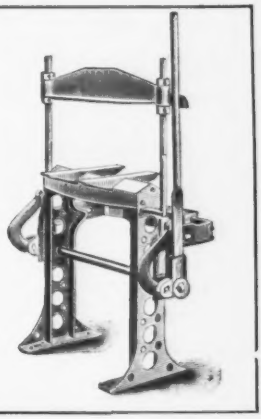
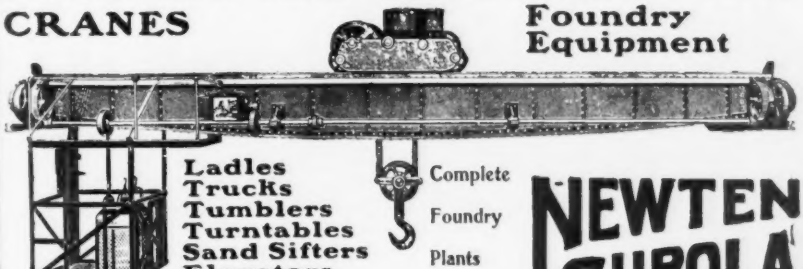


ELECTRIC AND COMPRESSED AIR CRANES

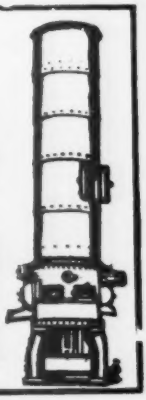
Foundry Equipment



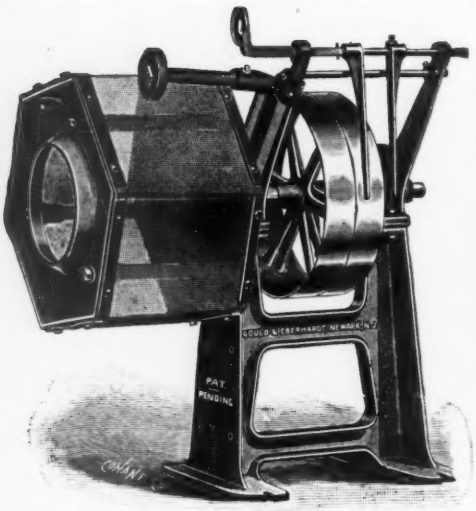
Ladles
Trucks
Tumblers
Turntables
Sand Sifters
Elevators

Complete Foundry Plants

NEWTEN CUPOLA



J. GILMOUR, Manufacturers' Agent, Bennett Bldg., New York, U.S.A.



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1 " 4 " " "
1 " 5 " " "
1 " 4 Wilbraham Baker Blower.
1 " 7½ " " "
1 " 7 Buffalo Blower.
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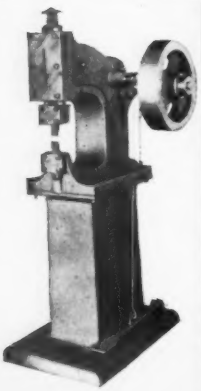

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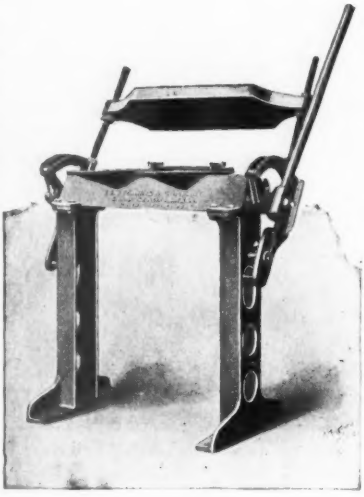

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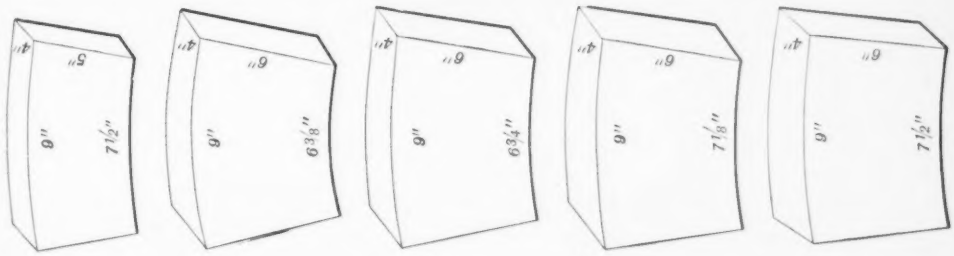

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